



**AN ASSESSMENT TOOL OF  
PERFORMANCE BASED LOGISTICS APPROPRIATENESS**

**THESIS**

Korhan G. Yukselen, 1<sup>st</sup> Lt., TurAF

AFIT-LSCM-ENS-12-25

**DEPARTMENT OF THE AIR FORCE**

**AIR UNIVERSITY**

**AIR FORCE INSTITUTE OF TECHNOLOGY**

**Wright-Patterson Air Force Base, Ohio**

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THESIS

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Korhan G. Yukselen, BS

1<sup>st</sup> Lt., TurAF

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Korhan G. Yukselen, BS  
1<sup>st</sup> Lt., TurAF

Approved:

\_\_\_\_\_  
Dr. J. A. Ogden (Chairman)

\_\_\_\_\_  
date

\_\_\_\_\_  
Dr. W. Cunningham (Member)

\_\_\_\_\_  
date

## **Abstract**

Performance Based Logistics is the most preferred product support strategy in Department of Defense. 'Using performance-based acquisition methods to the maximum extent practicable when acquiring services with little exclusion' is mandated. Although PBL should be used whenever feasible, few documents point out how to measure the feasibility of PBL. The aim of this research is to fill this gap by answering the question "What factors determine the appropriateness of the selection of PBL as a strategy for a specific acquisition?"

This research determines the factors affecting the success in selecting PBL as an acquisition method. Each factor is examined in detail and built into a spreadsheet tool which helps assess the appropriateness of PBL as an acquisition method. The purpose of this tool is to aid in PBL-related decision making processes and business case analyses. Various questions, asked by the tool, will let the user have a more objective assessment in a relatively short time.

**Dedication**

*To My Wife and My Baby*

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Korhan G. Yukselen

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## **List of Abbreviations**

A/C	Aircraft
ACV	Advanced Combat Vehicle
AF	Air Force
AFLMA	Air Force Logistics Management Agency
APU	Auxiliary Power Unit
AWACS	Airborne Warning and Control System
DAU	Defense Acquisition University
DoD	Department of Defense
DoDD	DoD Directive
DLA	Defense Logistics Agency
FAR	Federal Acquisition Regulations
FIRST	F/A-18E/F Integrated Readiness Support Teaming
FLIR	Forward-Looking Infrared Radar
FY	Fiscal Year
GOA	Government Accountability Office
HIMARS	High Mobility Artillery Rocket System
ITAS	Improved Target Acquisition System
JSF	Joint Strike Fighter
JSTARS	Joint Surveillance Target Attack Radar System
LCC	Life Cycle Cost
LCL	Life Cycle Logistics
LSCC	Life Support Command Center

NAE	Naval Aviation Enterprise
NAVICP	Naval Inventory Control Point
MICAP	Mission Capable
MTBF	Mean Time between Failures
OEM	Original Equipment Manufacturer
PBA	Performance Based Agreements
PBL	Performance Based Logistics
PBSA	Performance Based Service Agreements
PSB	Product Support Boundaries
PSI	Product Support Integrator
PWS	Performance Work Statements
PM	Program Manager
PSAT	Product Support Assessment Team
PSM	Program Support Manager
RAND	Research and Development Cooperation
RAF	Royal Air Force
RTOC	Reduction in Total Ownership Cost
SOE	System Operational Effectiveness
TLS	Total Logistics Support
TSPR	Total System Performance Responsibility
TSSR	Total System Support Responsibility
TOC	Total Ownership Cost
UAV	Unmanned Aerial Vehicle

# AN ASSESSMENT TOOL OF PERFORMANCE BASED LOGISTICS APPROPRIATENESS

## I. Introduction

### Background

Performance Based Logistics (PBL) is the determined product support strategy in Department of Defense (DoD) which capitalizes on integrated logistics chains and public/private partnerships. Not only it is suggested by Defense Acquisition University (DAU) but also PBL Implementation is mandated by DoD Directives. Besides Federal Acquisition Regulations (FAR) emphasizes that; performance-based acquisition should be the preferred method for acquiring services (Public Law 106-398, section 821). Agencies should use performance-based acquisition methods to the maximum extent practical when acquiring services with little exclusion (FAR 37.102).

Like North America, South America is trying to implement PBL as well as some European countries. As Bozkurt and Guducu (2005, p.49) state “Budget constraints drive all government entities to look for new and efficient ways to fulfill their missions.” The idea, underlying this worldwide phenomenon, is thought to be basically reducing costs. The F-35 project is supported by a 20% less maintenance cost expectation, comparing with substitute fighters (Sols and Verma, 2007). Chile, Ecuador, Paraguay, and Brazil are trying to adopt PBL with the purchase of the C-212 and CN-235 aircraft systems through European Aeronautic Defense and Space Company Construcciones Aeronauticas S.A. (EADS CASA) with likewise expectations (Cebeci, 2009). United Kingdom’s Royal Air Force (RAF) is expecting to reduce the maintenance costs of E-3D Sentry Airborne Warning and Control System (AWACS) aircraft

by 12 percent over previous similar systems (Sols, Nowick, Verma, 2007). Not only cost reduction but also performance improvements are expected.

Turkey is also affected by this phenomenon. In order to perform effectively, the Turkish Navy constantly pursues useful and efficient practices of PBL (Bozkurt and Guducu, 2005). Like the Turkish Navy, Turkish Air Force (TurAF) and Turkish Army supported PBL researches. There are some differences between U.S.A. and Turkey legacy systems regarding acquisition, but PBL becomes more popular day by day in Turkish Armed Forces. On the other hand as Bozkurt and Guducu (2005) state, these differences are not seemed to be a deal breaker to implement and apply PBL in service acquisitions. Turkish Air Force published a supplementary document to increase awareness about PBL in 2010. This supplementary document states the trend for PBL, beginning with F-35 Joint Strike Fighter project. (Hv.K.K.ligi, 2010) As seen PBL is still a newborn baby for TurAF and there is a long way to go.

There are a couple of studies that show the popularity and application of PBL in Turkey. Bozkurt and Guducu (2005) presented the differences in legacy and recommendations about how to implement PBL in Turkey. Cebeci (2009) examines the success of performance-based acquisition in non-western countries by exhibiting the cultural aspect, differences between non-western countries and the ones applying PBL. Denizer (2007) provides recommendations to improve Turkish Army's weapon system support and maintainability based on findings, and introduces potentials through the implementation of PBL practices for the Turkish Army. Turkey wants to develop its knowledge about PBL.



## **Problem Statement**

As stated before ‘application of PBL whenever and wherever it is possible’ is mandated. In opposition of these statements and regulations, there is not much regarding the feasibility of PBL or the factors affecting to select the best acquisition strategy. In his memorandum for Secretaries of the Military Departments Directors, Defense Agencies Director, Defense Logistics Agency J. S. Gansler (The under Secretary Of Defense - Acquisition and Technology) stated that “It is the policy of the Department of Defense (DoD) that, in order to maximize performance, innovation, and competition, often at lower cost, performance-based strategies for the acquisition of services are to be used wherever possible.” But also he admits that not all acquisitions for services can be conducted in a performance-based manner, which should become the exceptions although the vast majority can (The Under Secretary Of Defense Memorandum, 2000). But which one should be the exception, as it is mentioned in this Memorandum?

In their study; Cohen, Netessine and Kim (2006) admits that it would be wonderful paying for our car only when it works, or our television, or even our high-end toaster. They have been convinced that performance based systems are becoming widely accepted as an important component of a new strategy for the management of after-sales service supply chains. They decided to properly define PBL and to determine why and when PBL or power by the hour works. Their new study is based on examining the relationships between suppliers and customers, main drivers of performance improvement, incentive effects and the requirements for a successful PBL implementation. Regarding this point of view, this research aims to fill this gap in the literature; to determine which acquisitions should be fit by PBL and which should be exceptions as DoD defined. After finding the factors out, the researcher tried to build a tool that assess the applicability of PBL at any specific acquisition.

## **Research Questions**

The purpose of this study is finding out the factors that affects choosing PBL as an acquisition strategy and create a conformity assessment tool which states whether PBL is a good choice for that acquisition or not.

In order to create this tool the following research question was investigated:

- What factors determine the appropriateness of the selection of PBL as a strategy for a specific acquisition?

In addition to the research question, several investigative questions were established to support the study, which will be discussed in further chapters:

- What is the current policy to use PBL? Regarding this policy does every acquisition fit in PBL?
- Has DOD ever experienced any failure/pitfall due to selecting PBL as a strategy?
- How do these criteria effect acquisition regarding PBL?
- Is this assessment tool usable in every service-acquisition decision?

## **Scope**

The assessment tool will be created for decision makers to reduce their decision time in making more precise decisions. Therefore the ideas, which are mentioned in this study, are only from the decision makers' point of view.

In addition to that, the Turkish regulation system does not allow any awards option years or anything beyond fixed price. On the other hand, according to U.S. regulations the agencies must use the following order of precedence when acquiring services: (1) A firm-fixed price performance-based contract or task order. (2) A performance-based contract or task order that is not firm-fixed price. (3) A contract or task order that is not performance-based (FAR Subpart

37.102). In addition to regulations as Gardner's (2008) research findings stated, PBL implementers should strive to achieve a fixed price contract for their programs. As seen, Fixed Price contracting is suggested by law and it is beneficial as long as the outcome with the price is well-defined. This study does not include incentives' effect such as award option years.

## **Methodology**

This research is based on a literature survey conducted on the papers published in connection with this topic since the advent of the PBL. According to the literature, factors which affect PBL's success are determined. A scale for each factor is created for the tool. In addition to that scale, weights are assigned to each. User may also give custom score and/or weight to each factor.

There are 2 types of scores and 3 types of weights used in the tool. Tool evaluated score, which is calculated according to the answers given to corresponding questions, and user determined score. Occurrences' frequency weight comes up from the sample literature; author determined weight is the weight into which importance of that factor is taken account, in addition to occurrences' frequency, and user determined weight are the customized weight by user. Occurrences in the sample literature are presented in Appendix A.

The tool is created in Excel by logical functions, and algebraic calculations. The general score is the sum of all factor's score. According to this score, tool gives advices to use PBL as an acquisition strategy or not and also points out to which factors user should pay more attention.

Five different examples are presented at application section. Data is collected from subject matter of experts' and/or program managers' studies, opinions, and ideas regarding that specific acquisition. Due to confidentiality reasons, their names and units are not given and some of the data are disguised within the range of evaluation score.

## **Assumptions**

The PBL approach must ensure compliance with all statutory and regulatory requirements, and in particular, the statutory limitations of the Turkish legislative and statutory system. Therefore, it is assumed that such a willing country has already made the required arrangements at the point of selection an acquisition strategy from alternatives including PBL. In application sections for some PBL programs it is assumed to have an exception for these statutory limitations approved by the Turkish Grand National Assembly. But these exceptions are assumed to be present at a minimum level.

## **Implications and Summary**

Constraints; such as shrinking budget, decreasing funds, incentives to increase performance, etc. force all countries to find new ways of acquisition. Therefore the growing popularity and usage of PBL attracts all. Turkey is one of the followers, too. This study will help Turkey to increase its knowledge about PBL and provide insight regarding the factors affecting in selection of PBL as an acquisition strategy.

As stated before, there is not much study regarding the feasibility of PBL as an acquisition strategy although to implement PBL is mandated and encouraged. Therefore, this research is significant, because it is one of the few studies which assess the applicability of PBL for a specific acquisition.

In addition, this research suggests using the tool in decision making of whether to use PBL as a strategy or not for a particular acquisition. Managers do not have much time to make everything in order. As Kaplan and Cooper (1997, p.144) stated; beyond all, “the scarcest resource in an organization is a manager’s time.” The tool, created by this study, will save

managers' time in decision making progress; help them not to get lost in lots of criteria or making wrong decisions.

The introduction chapter provides a summary about performance-based acquisition and states the research problem addressed by the study. Afterwards methodology used in the research was discussed, simply. The next chapter presents a detailed literature review regarding PBL and factors affecting in the selection of PBL as an acquisition strategy. Chapter 3 provides a detailed description of the methodology used for determining factors/weights, and building the assessment tool. Chapter 4 presents application of the tool, data collection and analysis. Chapter 5 includes conclusion of the study, limitations and recommendations for future research.

## **II. Literature Review**

### **Overview**

Eighty one documents, including articles in journals, DoD guides, thesis, surveys, white papers, etc. are examined for determining the criteria in selection of PBL as an acquisition method. These are explained in detail according to their frequency in this section. While reviewing the literature; emphasis is kept on the factors which effects PBL's success. The author came up with thirteen factors; which are obligatory for PBL. These factors are below:

1. Reduction in total cost of ownership, life cycle cost
2. Presence, determination of metrics, performance outcomes
3. Improvement in performance
4. Partnership, strategic alliance
5. Length of contract
6. Flexibility
7. Better service, best value creation, best practices
8. Successful implementation of PBL, PBL experience and training
9. Innovation
10. Data availability
11. Candidates and competition
12. Properties of system
13. Up-front, early planning

Many authors mentioned risk and the stage of PBL. But these are not seemed to be factors that may affect the success of PBL. In addition to that their effect is enclosed by the other factors' effects. Risk and stage of PBL will be discussed in details at the end of this section.

## **1. Reduction in Total Cost of Ownership, Life Cycle Cost**

In sixty out of eighty one documents, reduction in total cost of ownership (TOC) is mentioned regarding PBL and mostly it is stated as PBL's purpose. DoD mandates the use of performance based strategies for acquiring and sustaining products and services whenever feasible "to maximize competition, innovation, and interoperability, and to enable greater flexibility in capitalizing on commercial technologies to reduce costs." (DoDD 5000.1, 2003, p.7) As seen, one of the purposes of using PBL is to reduce costs for DoD. DoD PBL Guide (2005) cited this and states that PBL application should be cost effective as validated by a Business Case Analysis. By DoD's words; "The primary objective of Defense acquisition is to acquire quality products that satisfy user needs with measurable improvements to mission capability and operational support, in a timely manner, and at a fair and reasonable price." (DoDD 5000.1, 2003, p.3) DoD wants program managers to develop and implement performance-based logistics strategies that optimize total system availability while minimizing cost and logistics footprint (DoDD 5000.1, 2003, p.7). Therefore it can be stated that PBL might have been discovered under the budget pressure and requirement for reducing costs.

Nine of the eighty one documents cited DoD's statements above. Buyukgural (2009, p.88) also adds "The main promise of the PBL is: enabling and sustaining a desired level of performance with a reasonable cost via the innovative approaches and the cumulated experiences of the contractors." Bozkurt and Guducu (2005) count "savings' achievement" as one of the main purposes of PBL. In their report, Pettingill, Knipper, Gaudette and Gayer (2004) compares the definitions used for PBL and emphasize on Navy's usage of "reducing TOC" and DoD's "minimizing cost and logistics footprint". They suggest using both; "reduced logistics footprint", and "reduced total ownership costs" in definitions. For Kratz (2001, p.12) it is a key element of

DoD's performance based environment; "program managers to guide continuous improvement of weapon system supportability and reduction in operating costs by dedicated investments."

Twenty one documents supported cost reduction as a factor with examples. Table 1 shows the examples used by corresponding documents.

Table 1. Examples used in documents– Reduction in Total Cost.

	ITAS	F-117	JSTARS	APU	GE 404	A/C Tires	C-17 GSP	Shadow	F-22	U.K. Tornado	T-45	F/A-18E/F FIRST	KC-130J	H-60 FLIR	HIMARS	M-1 Abrams	JAVELIN	U.K. E-3D
Bellis (2001)						X												
Berkowitz et al. (2003)	X																	
Boehk (2003)			X													X		
Canaday (2006)							X			X								
Cebeci (2009)	X	X	X															
Gansler, Lucyshyn, Harrington and Corl (2011)				X														
GAO Report: PBL (2008)								X		X								
Geary, Koster, Randall and Haynie (2010)													X					
Goure (2009)							X		X									
Goure (2010)	X		X		X				X		X	X						
Goure (2011b)							X											
Kratz and Buckingham (2010b)						X												
Mahadevia, Engel and Fowler (2006)						X												
Owings (2010)								X										
PBL Guide (2005)	X	X	X	X														
Sols and Verma (2007)																		X
Spring (2010)																	X	
Vitasek and Geary (2008)														X				
Vitasek, Cothran and Rutner (2006)		X			X										X			
Vitasek, Cothran and Rutner (2007)				X	X													
Vitasek, Geary, Cothran and Rutner (2006)		X		X	X													
Total	4	4	4	4	4	3	3	2	2	2	1	1	1	1	1	1	1	1

### ***TOW Improved Target Acquisition System (ITAS)***

This is a system designed for light infantry forces. It is improved for target acquisition and fire control.

"The ITAS increases target detection, acquisition, recognition, and engagement ranges, using a second-generation Forward-Looking Infrared Radar (FLIR), an eye-safe laser



range-finder, and other digital components. TOW ITAS provides a highly mobile, adverse weather, day or night capability needed by early entry forces to destroy advanced threat armor at greater stand-off ranges. ITAS fires all versions of the TOW missile from both the M41 ground launcher and the M1121 HMMWV platform and provides a growth path for future missiles.” (Performance Based Logistics: A Program Manager’s Product Support Guide, 2005, p.5-3)

A PBL contract was signed with Raytheon in 2001 for logistics support. As stated, in the PBL guide (2005); TOW ITAS is one of the Reduction in Total Cost (RTOC) pilot programs that benefited from the PBL efforts. Table 2 shows the cost avoidance results per each fiscal year:

Table 2. Cost Avoidance of ITAS PBL Program (Berkowitz et al., 2003, p.92).

	<i>FY 2001</i>	<i>FY 2002</i>	<i>FY 2003</i>	<i>FY 2004</i>	<i>FY 2005</i>	<i>Total FY 99- TC</i>
CLS (TY\$)	7.7	10.8	13.5	12.9	16.0	601.1
Organic (TY \$)	18.2	27.4	18.2	21.9	29.0	944.6
Cost Avoidance	10.5	16.6	4.7	8.9	13.1	343.5
CLS Cost Avoidance Major Contributors: No TDP, Replenishment Spares, Initial Spares						

CLS stands for contracted period. As seen above, there is significant cost avoidance. Defence Acquisition University (DAU) points out the cost decrease per system shown in Figure 1.

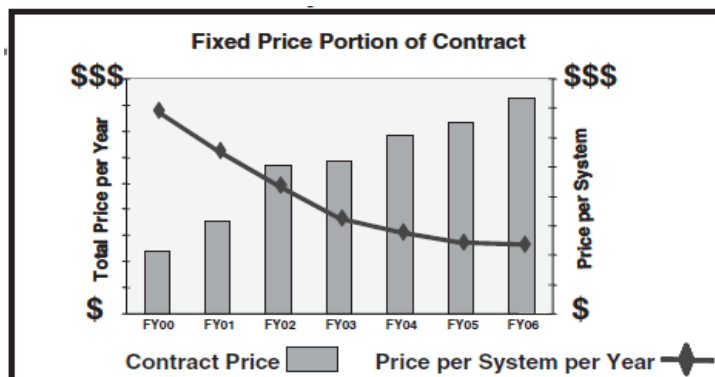


Figure 1. Cost per System for ITAS Program (PBL Guide, 2005, p.3-23).

According to Army’s records Goure (2010) states that ITAS for the TOW missile has provided \$350 million in cost avoidance with better than 90 percent availability over the past seven years. This means approximately 33% less cost than organic structure.

### ***F-117 Nighthawk***

This is the first low-observable stealth operational aircraft.

“This precision-strike aircraft penetrates high-threat airspace and can employ a variety of PGM against critical targets. The F-117 is equipped with sophisticated navigation and attack systems integrated into a digital avionics suite that increases mission effectiveness and reduces pilot workload.” (Performance Based Logistics: A Program Manager’s Product Support Guide, 2005, p.5-2)

Lockheed Martin has Total System Performance Responsibility (TSPR) for the F-117 weapon system, implemented in 1998 and at first for 5 years. This is also one of the Reduction in Total Cost (RTOC) pilot programs that benefited from the PBL efforts. At first it was thought that the program is responsible for \$47.5 million in savings for the government till June 2006 (Vitasek, Geary, Cothran and Rutner, 2006, p.9). According to Vitasek, Cothran and Rutner (2006, p.5), the total savings achieved is \$217.5 million. This savings include the one, gained from reducing government Program Office manning from 265 people to 48 people, by means of \$90 million savings. Therefore it is obvious that the savings also occurred even in human resources area.

### ***E-8C Joint Surveillance Target Attack Radar System (JSTARS)***

JSTARS is an airborne command post.

“The E-8C Joint Surveillance Target Attack Radar System (JSTARS) is an airborne battle management, Command and Control platform. From a standoff position, the modified 707- 300 manned by a joint Army-Air Force crew, detects, locates, tracks, and targets hostile surface movements, communicating real-time information through secure data links to Air Force and Army command centers.” (Performance Based Logistics: A Program Manager’s Product Support Guide, 2005, p.5-4)

Northrop-Grumman has TSSR for sustainment of JSTARS over a maximum contract period of 22 years. This is also one of the Reduction in Total Cost (RTOC) pilot programs that benefited from the PBL efforts (Performance Based Logistics: A Program Manager’s Product Support Guide, 2005). Boehk (2003) states that JSTARS flew 100 percent of scheduled missions over Afghanistan, realizing \$30.8 million in fiscal years 2001 and 2002. Goure (2010) supported

the idea with more recent data; in 2007 the Air Force analyzed the business case for its PBA and concluded that it generated savings of \$38 million.

***Naval Inventory Control Point (NAVICP): Auxiliary Power Unit (APU)***

This PBL contract is the first public/private partnership in naval logistics. In addition to that, it is also one of the Reduction in Total Cost (RTOC) pilot programs that benefited from the PBL efforts. Honeywell Corporation is the Product Support Integrator (PSI) in this partnership. This 10 year (5 year base with 5 – 1 year renewal options) contract was signed in June of 2000 (Vitasek, Cothran and Rutner, 2007). The APU/Total Logistics Support (TLS) PBL contract shifts total management responsibility for APU types used on the F/A-18, S-3, C-2, and P-3 aircraft, including all peculiar components and accessories (Performance Based Logistics: A Program Manager's Product Support Guide, 2005). PBL Guide states that Life Cycle Cost (LCC) savings should exceed \$50 million through this partnership. According to Vitasek et al. (2007); in addition to many performance improvements a \$70 million savings was documented for this program in August of 2005. APU Total Lifecycle Support program took the PBL awards at component level in 2005. It is estimated to achieve \$70 million savings over the life of the 10-year contract (Vitasek, et al., 2006). Therefore it exceeded these expectations. In a recent study Gansler, Lucyshyn, Harrington and Corl (2011) stated that \$35 million in total cost savings and cost avoidance occurred with \$8.5 million in annual inventory savings in FRC-East APU public-private partnership. As seen the savings is not only occurred in maintenance but also occurred in inventory. Gansler, et al.'s (2011) recent study includes the recent BCA.

“The BCA concluded that the Navy would save \$13.98 million over 10 years by awarding the DVD/TLS contract to Honeywell—which was revised to a \$34.8 million savings when additional benefits were considered. In 2007, the Navy identified that the cost savings were greater than \$50 million. ... NAVAIR credited the TLS partnership with more than 30 reliability improvements which it estimated would produce upwards of \$50 million in cost avoidance and savings. ... The FRC-East APU public-private

partnership has captured a total of \$35 million in benefits for the Navy to date.” (Gansler et al., 2011, p.31-42)

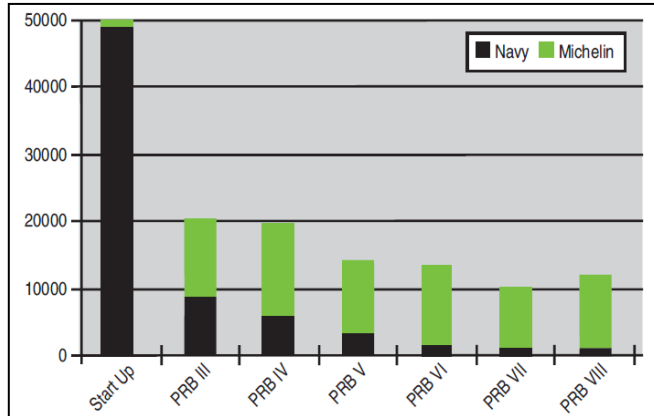
### ***Navy/GE F404***

GE F404 Aircraft Engine is the power of Navy’s front line fighter and attack aircraft, the F/A-18 Hornet. This is A PBL partnership program with General Electric to increase the availability of F/A-18 aircraft engines for 4½ years. According to Vitasek et al. (2007) the success is huge for this program; while improving performance, there has been a reduction in the total cost of ownership of 13.8% by means an impressive \$79M and partners expect more than that by ongoing program. By these achievements the program was awarded at the sub-system level (Vitasek et al., 2006). While stating performance improvements, Goure (2010) states that there is reducing in inventory costs (and thereby costs to the Air Force) of roughly 21 percent. As seen this is another cost effective successful PBL program of DoD.

### ***Naval Inventory Control Point: Aircraft Tires***

“The Naval Inventory Control Point (NAVICP) Aircraft Tires PBL contract transfers traditional Department of Defense (DoD) inventory management functions to the contractor, which will guarantee a level of tire availability versus physical inventory. Under this vehicle, the contractor is tasked to become the single supply chain integrator for Navy aircraft tires and is responsible for requirements forecasting, inventory management, retrograde management, stowage, and transportation.” (Performance Based Logistics: A Program Manager’s Product Support Guide, 2005, p.5-6)

In July of the year 2001 Michelin Aircraft Tire Company, LLC, and Lockheed Martin agreed on a PBL with NAVICP. Michelin became Navy’s agency to procure, manage, and supply spare parts for naval aircraft, submarines, and ships worldwide, is responsible for more than 400,000 items of supply, \$27 billion of inventory, and \$4.2 billion in annual sales (Mahadevia, Engel and Fowler, 2006, p.30).



Seventy five percent reductions occurred in retail-level inventories at continental United States air stations as shown in Figure 2.

This will reduce TOC for Navy absolutely.

Figure 2. Inventory Reduction in A/C Tires Program (Mahadevia, et al., 2006, p.30).

According to Navy, it is projected that there would be significant cost savings totaling more than \$46 million over 15 years (Mahadevia, et al., 2006; Kratz and Buckingham, 2010b; Bellis, 2001). In addition to that, Kratz and Buckingham (2010b) think that the privatization effort of aircraft tires continues to save money on costs associated with not only acquisition but also storage, maintenance, and disposal by placing these responsibilities on Michelin.

### ***C-17 Globemaster***

C-17 is a large military transportation aircraft used for strategic lifting. Under the C-17 PBL agreement, Boeing is the prime vendor. Boeing is responsible for the entire aircraft. Boeing subcontracts depot repairs to the U.S. Air Force at Warner-Robins, engine work to Pratt & Whitney and components to other firms. According to Pat Finneran, president of support systems at Boeing IDS; \$10 million in annual costs have been saved and \$500 million in duplicate infrastructure costs were avoided by the PBL approach (Canaday, 2006, p.2-3). For C-17 PBL program Goure (2009) states \$562 million cumulative savings to the government in the first ten years. Goure (2011b) also used C-17 example in his recent study to oppose the idea of going back to organic maintenance, due to the over \$1 billion savings to the Air Force. He states that organic structure will not be cost effective.

### ***Other Examples***

**Shadow Unmanned Aerial Vehicle (UAV):** UAS PO and AAI made up the PBL team, which is responsible for all system. This team's goal is maintaining the warfighter readiness with increasing cost efficiency. 25 percent contract cost reduction, while the System Status Readiness (SSR) rate remained consistently above 90 percent has been achieved by this program (Owings, 2010, p.16). According to GOA report (2008), the maximum amounts authorized in the annual cost-reimbursable PBL contract for the support of this system were reduced by 28 percent from fiscal years 2006 through 2007.

**F-22 Raptor:** This PBL program had 2008 PBL System Level Award. Lockheed Martin is responsible for F-22 sustainment. 40 percent reduction is reported in costs by means of hundreds of millions dollars savings with improved aircraft availability (Goure, 2009, p.1; Goure, 2010, p.7).

**Tornado Support in United Kingdom (U.K.):** This is one of the five pilot PBL programs with BAE in U.K. At one of the Royal Air Force base, Tornado radar support requires 50 percent less inventory now, and costs are down by 45 percent; secondary power systems on the aircraft cost 23 percent less. These are concluding 30 percent less support costs while achieving all of the milestone objectives. In addition to that the agency aims to cut costs by up to 50 percent while improving availability with a 10 year program (Canaday, 2006, p.2).

**T-45 Trainer:** Navy renewed the contract with Rolls-Royce for support of the engines with an expectation of \$65 million for 5 year contract period.

“According to the former Commander, Naval Air Systems Command: The success of Performance Based Logistics (PBL) has allowed the Naval Aviation Enterprise (NAE) to improve support to the warfighter and achieve weapon system readiness at lower life cycle costs.” (Goure, 2010, p.5)

**F/A-18E/F Integrated Readiness Support Teaming (FIRST) Program:** According to Goure (2010) this program is one of the major successes. The expected cost savings is \$688 million over the life of the program based on the business case analysis.

**KC-130 J:** This is a NAVAIR–NSWC Crane Partnership program. Geary, Koster, Randall and Haynie (2010) cite Camacho (2008) and state that this PBL sustainment program saved the government \$42 million by reducing the cost per flight hour by nearly 75 percent from 2005 to 2007.

**Forward Looking Infrared (FLIR) for H-60:** Raytheon has built to FLIR for H-60 helicopters according to DoD’s specs. They had a PBL agreement which were projected to have around \$31 million cost savings, but by June 2008 it has been estimated to exceed \$42 million (Vitasek and Geary, 2008, p.63).

**High Mobility Artillery Rocket System (HIMARS):** This system’s support responsibility is under Lockheed Martin. According to the Army study; \$412 million cost savings over the traditional method of organic only support is expected (Vitasek, et al., 2007).

**Army’s M-1 Abrams:** A potential cost reduction of \$17 billion in operations and sustainment over the next 30 years of service is expected from Army’s M-1 Abrams PBL partnership projects (Boehk, 2003).

**JAVELIN:** This is an anti-tank weapon to which Lockheed Martin supports via a PBL agreement. According to Spring (2010); industry assesses the cost-benefit improvement derived from the program to be 10 percent.

**E-3D Sentry Airborne Warning and Control System (AWACS):** Sols and Verma (2007) cite Kemp (2005) and state AWACS as an example of the reduction in costs that will

result from higher efficiencies along with achieved pre-set performance goals: The Royal Air Force in the U.K. is expecting to reduce costs by 12% in the outsourced maintenance of its fleet.

As seen from the examples; PBL is an effective method to reduce cost, especially in an increasing age/maintenance cost environment. Under Secretary of Defense Jacques Gansler described this phenomenon with ‘death spiral’ term. It is:

“... a cycle where aging weapons and inefficiencies in the support programs for existing weapons divert defense dollars to the maintenance accounts, which results in deferral of the procurement of new weapons, which in turn results in older and more expensive-to-maintain weapons.” (Gansler, et al., 2011, p.8; Spring, 2010, p.4)

Therefore it can be simply stated that PBL is invented to attack death spiral. Gansler’s aggressive acquisition reform’s key initiatives include increased use of commercial items, evolutionary acquisition, streamlined acquisition documentation, and performance based logistics (Kratz and Buckingham, 2010a). It is obvious; using PBL will save money. What should be done with this money is described by Spring (2010, p.4):

“If the maintenance costs incurred for the support of existing weapons can be reduced, the savings can be channeled into the acquisition of new weapons that will be less expensive to maintain. While this step will require larger overall defense budgets for the core defense program, it can help to initiate a reverse dynamic that will permit the death spiral to become a recovery spiral.”

Although Gansler is seemed to be an aggressive supporter of PBL as an cost effective tool, Cebeci (2009) cites Gansler (2000) when he states “Performance-based practices are expected to help the Department of Defense (DoD) improve performance, encourage innovation, and increase competition in services, often at a reduced cost to the government.” He states that PBL does not always result with reduced costs. But mostly it is the intent for PBL.

“The evidence is clear: PBL works. PBL delivers dramatic improvements in performance with lower operating costs across the total life cycle. PBL does more for the warfighter with less from the taxpayer. Instead of paying for transactional activities, the government and industry partners deliver improved performance at lower costs.” (Fowler, 2009, p.7)



According to Geary and Vitasek (2005, p.1)

“PBL is the most impressive thought we’ve seen, with both intellectual rigor and real results, endeavoring to reform weapons program spending. It’s a real solution to a real problem, already delivering improved performance at lower total cost.”

Hedden (2005) defines PBL and counts decreasing costs per unit usage as one of the goals of PBL.

According to Vitasek and Geary (2008, p.65) “PBL has been proven to be effective as a means of purchasing higher quality results at lower cost to the government by allowing defense contractors to utilize industry best practices. Facts show that the use of PBL can bring extensive improvements to a weapon system, while lowering costs and increasing reliability and availability.” As a result PBL is an acquisition method, which buys pre-set performance outcomes (or even improve them) with lower TOC.

## **2. Presence, Determination of Metrics, Performance Outcomes**

In fifty five out of eighty one documents, metrics or performance outcomes is mentioned regarding PBL and it is stated as an obligation for it. When using PBL as an acquisition method, performance outcomes are tried to be bought. Therefore we should have some metrics in hand.

“A key component of any PBL implementation is the establishment of metrics. Since the purpose of PBL is ‘buying performance,’ what constitutes performance must be defined in a manner in which the achievement of performance can be tracked, measured, and assessed.” (Performance Based Logistics: A Program Manager’s Product Support Guide, 2005, p.2-4)

According to Federal Acquisition Regulations (FAR) subpart 37.601; performance based contracts for services shall include performance work statements (PWS) and measurable performance standards in terms of quality, timeliness, quantity, etc. (FAR 37.6; Memorandum: Performance-Based Services Acquisition, 2000). Further defines PWS; describing the required results in clear, specific, and objective terms with measurable outcomes (GAO Report, 2008).

DoD PBL guide states that; a successful PBL depends on these metrics which accurately reflect the customers' needs and can be an effective measure of PSI's performance. In PBL environment, contract requirements shall be stated in performance terms, limiting the use of military specifications and standards to Government-unique requirements only (DoDD 5000.1, 2003, p.7). DoD also issued another guidance regarding life cycle management that focuses on life cycle metrics, aligning resources and readiness, and implementing performance-based life cycle product support (Kratz and Buckingham, 2010a).

Cebeci (2009, p.15) cites these regulations and also Garrett (2005). Garrett (2005) states that experts in US federal government contracting and acquisition management think that; the essential elements of PBA are performance requirements, performance standards, performance measures and metrics, contractual incentives, and appropriately tailored terms and conditions that are specific to the unique acquisition environment. In addition, he found in his study that "Interviewees acknowledged that while it is difficult to define the best, most fair, and most reasonable performance metrics for both the government and the contractor, defining those standards is the key to acquisition success." (p.47) Heller (2001, p.2) states that Performance Based Logistics consists of output performance parameters to ensure the system ready capability. According to Kobren (2009, p.261) the key in PBL is to establish solid, well crafted, integrated metrics and incentives emphasizing the desired performance outcomes.

David V. Pauling, Deputy Undersecretary of Defense, Materiel Readiness, and Maintenance Policy, admits at an interview with AAD in December 2006 that they need to build on lessons learned from continuous process improvements, and apply an overall performance-based outcomes approach, tying all budgeting and contracting to a warfighter-supported metric (Blumberg, 2007a, p.42).

DoD PBL Guide helps to find out what these metrics should be. The guide cites the memorandum of Under Secretary of Defense (Acquisition, Technology and Logistics Memorandum, August 16, 2004, Performance Based Logistics: Purchasing Using Performance Based Criteria) and determines the five top-level metrics; operational availability, operational reliability, cost per unit usage, logistics footprint and logistics response time. Therefore “PBL outcomes are expressed in terms of operational availability, such as the number of available flight hours for an aircraft. Other measures are increased mission reliability, and reductions in operations and support costs, logistic footprint, and logistics response time.” (Blumberg, 2006a, p.57) All desired outcomes should be linked to these metrics, even if PSI is organic. “For all PBL contracts, warfighter requirement(s) will be linked to metrics and metrics to contract incentives. For all organic PBL PSIs, warfighter requirement(s) will be linked to metrics and metrics to PBAs between the PM and the organic PSIs.” (Performance Based Logistics: A Program Manager’s Product Support Guide, 2005, p.3-30) DoD mandates to measure support performance based on the high-level metrics, such as availability of mission-capable systems, instead of on distinct elements such as parts, maintenance, and data (DoDD 5000.02, 2002, p.36). Therefore these key performance parameters are so important to the warfighter and need identification from the start point (Pettingill, et al., 2004). Hedden (2005) accepted these metrics as PBL goals.

Paying for results is PBL’s purpose. Mitchell (2008) cites Sandborn (n.d.): “The military is going to this ... They’re not going to own airplanes anymore. They’re simply going to buy availability of airplanes.” PBL can be simply defined as buying performance, support outcomes at a whole new level, (Vitasek, et al. 2006; Venema, 2007; Hedden, 2007) instead of buying basic elements of support such as parts, spares; transaction goods or services (Geary and Vitasek,

2005; Wuchenich, 2008; Cothran, 2008; Ott, 2008; Goure, 2010) and besides Vitasek et al. (2006, p.2) match these key metrics to corresponding questions:

Table 3. Vitasek et al.'s questions to key metrics.

<b>Metric</b>	<b>Problem Addressed</b>
Operational Availability (Ao)	Are we ready?
Mission Reliability	Will we be effective?
Cost per Unit Usage	What is the cost?
Footprint	How much “stuff” do we need?
Logistics Response Time	Are we sustainable?

Two of the fifteen attributes of a good PBL, which have been identified by as part of the research at the University of Tennessee, are below:

“Performance Definition: Top-level broad scope outcomes optimizing readiness, availability, reliability, cycle time, and affordability.

Performance Measurement: Minimum number of top-level ‘Outcome’ metrics that measure and are aligned to warfighter needs and tightly aligned with Support Provider scope of authority.” (Vitasek and Geary, 2008, p.63)

Harada (2010) categorizes the metrics, can be used in PBL, into 3 groups; Effectiveness, efficiency and response time. In his categorization effectiveness includes 2 of the 5 top-level metrics; availability or readiness (combined regarding top-level metrics) and reliability. He also puts customer feelings in this category. He made a detailed description for each group, subgroup and items underneath. Table 6 shows the metrics he came up with.

Gansler et al. (2011, p.9), Harada (2010, p.17-19), Bozkurt and Guducu (2005, p.16-17) described these five top-level metrics:

- Operational availability: The percent of time that a system is able to conduct operations per demand.
- Operational reliability: The measure of a system in meeting mission success objectives (such as a sortie, tour, launch, destination reached, capability, etc.).

- **Cost per unit usage:** The total operating costs per the appropriate unit of measurement for a given system (such as costs per flight hour, steaming hour, launch, and mile driven, etc.).
- **Logistics footprint:** The size of logistics support, adequate to deploy, sustain, and move a system (such as inventory/equipment, personnel, facilities, transportation assets, and real estate).
- **Logistics response time:** The period of time from logistics demand signal sent, till it has been satisfied.

Figure 3 shows Harada's (2010) metrics and categorization.

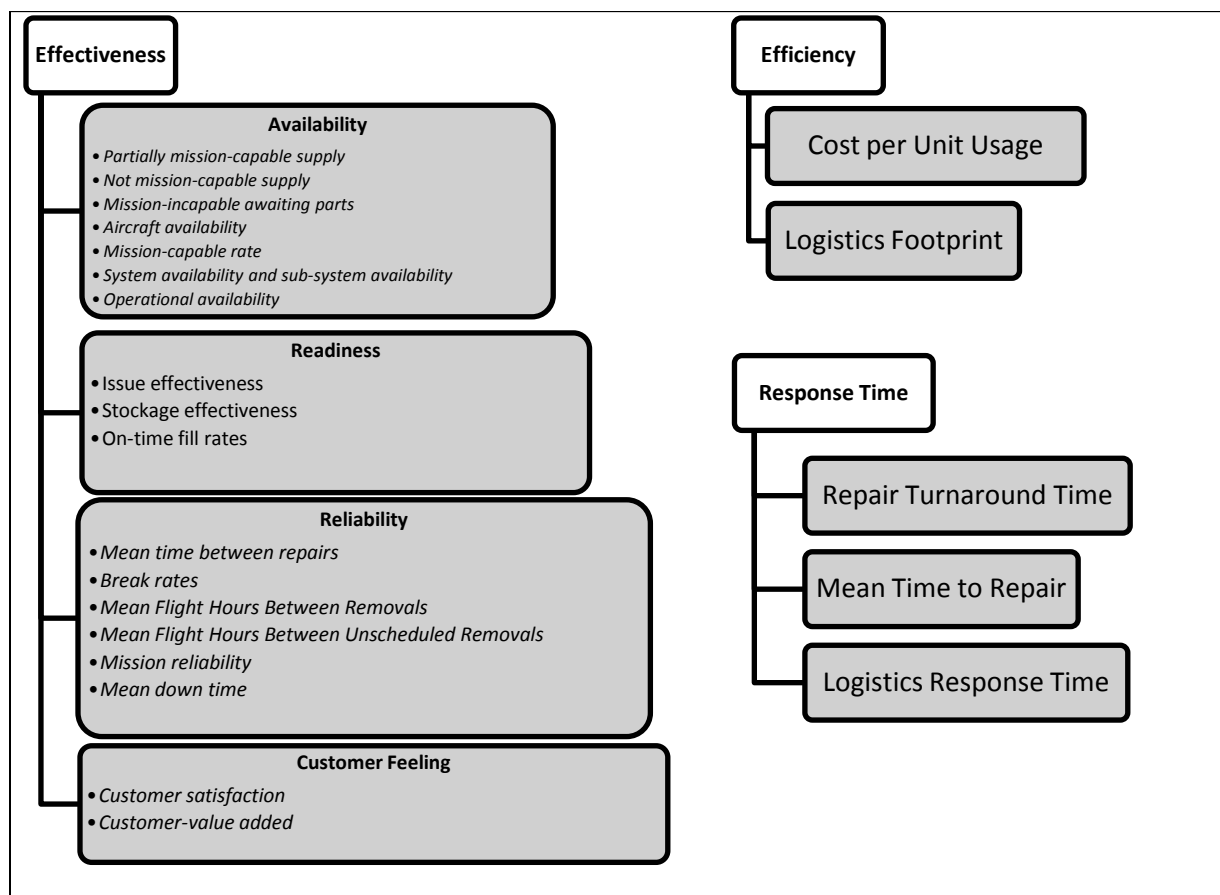


Figure 3. Harada (2010)'s Metrics and Categorization.

Just using the appropriate metrics in contracts is not enough. There are other requirements for a good PBL. Harada (2010, p.20) cites Sols, Nowicki & Verma (2008) and

makes suggestions what to do with metrics: Select performance metrics; establish baseline values for each performance metric; set target values for each performance metric, define an n-dimensional reward scheme and measure the actual effectiveness. Berkowitz et al. (2003) emphasizes defining and clarifying performance metrics and states that these metrics should be easily understood and quantified.

According to Berkowitz et al. (2003) performance levels, metrics should be aligned to goals.

DoD PBL Guide  
used TOW ITAS PBL  
program as a good  
example for metrics  
determination. In that  
program profitability is  
linked to availability;  
therefore higher  
availability comes with  
higher profits. 98-100 percent

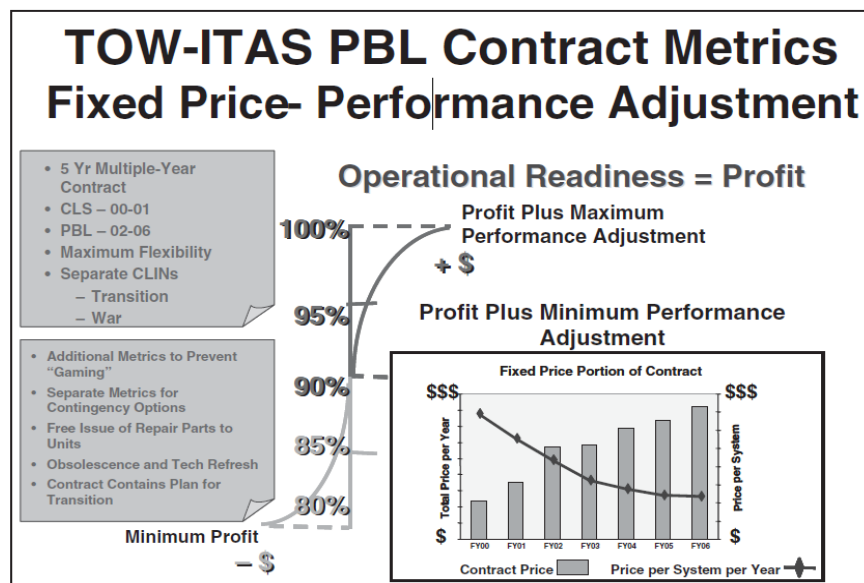


Figure 4. TOW ITAS PBL Contract Metrics  
(DoD PBL Guide, 2005, p.3-23).

operational availability has been captured by Army since February 2001. Figure 4 shows this program's contract metrics.

Another good example is Shadow UAV PBL program. This PBL program has exceeded all of its performance goals in 6 months period at Operation Iraqi Freedom. Figure 5 summarizes the program and metrics pyramid.

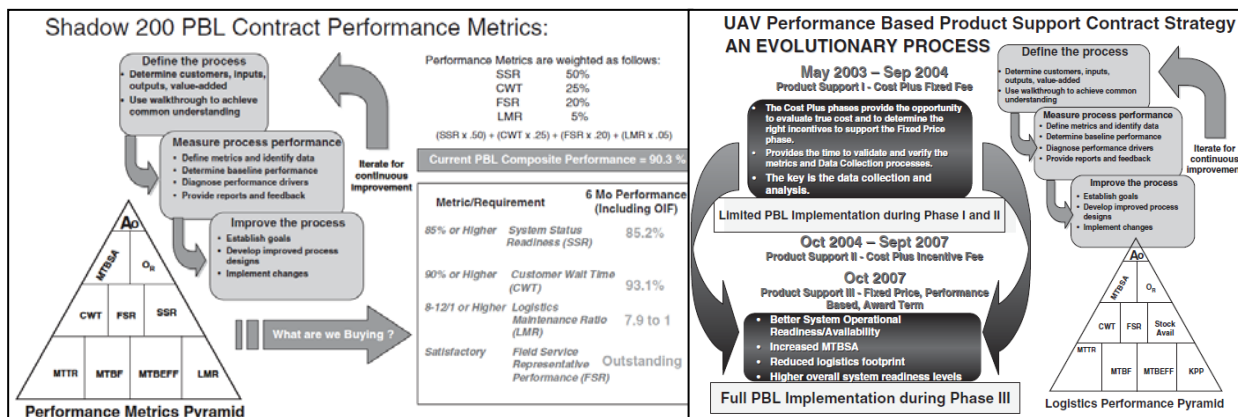


Figure 5. Shadow UAV PBL Program. (DoD PBL Guide, 2005, p.3-25).

One of the lessons learned in JSTARS PBL program's success comes from focusing on the warfighter requirements and managing it effectively with an extensive set of metrics (Lessons Learned, 2004, p. 2). The PSI, Northrop Grumman, is awarded according to both qualitative and quantitative metrics. Customer feedbacks form the qualitative part and depot delivery of aircraft, non-mission capable for supply rates, mission capable delivery times, in-flight trainer sorties, readiness spares package fill rate, and contract cost performance form the quantitative part. But there are issues about measuring aircraft availability or logistics footprints due to having metrics to measure neither of them (Pettingill, et al., 2004, p.18-23).

Like the Air Force, the Navy has lots of experience and suggestions about determining and using these metrics. It is advised by Navy that "sound, realistic performance metrics" should be developed for success. One of the other concerns of Navy is "early establishment and use of metrics" (Lessons Learned, 2004, p. 2).

Global Hawk PBL program with Northrop Grumman is a good example for early implementation of metrics. Figure 6 shows the roadmap. This program is considered best practice of PBL implementation scheduling.

“The schedule is particularly noteworthy because it presents objectives for the integration of PBL throughout an 8-year period (FY04 – FY11). ... PM started considering PBL as a support strategy early in FY04 by defining the metrics, costs, and the systems used to collect this data.” (Pettingill, et al., 2004, p.20)

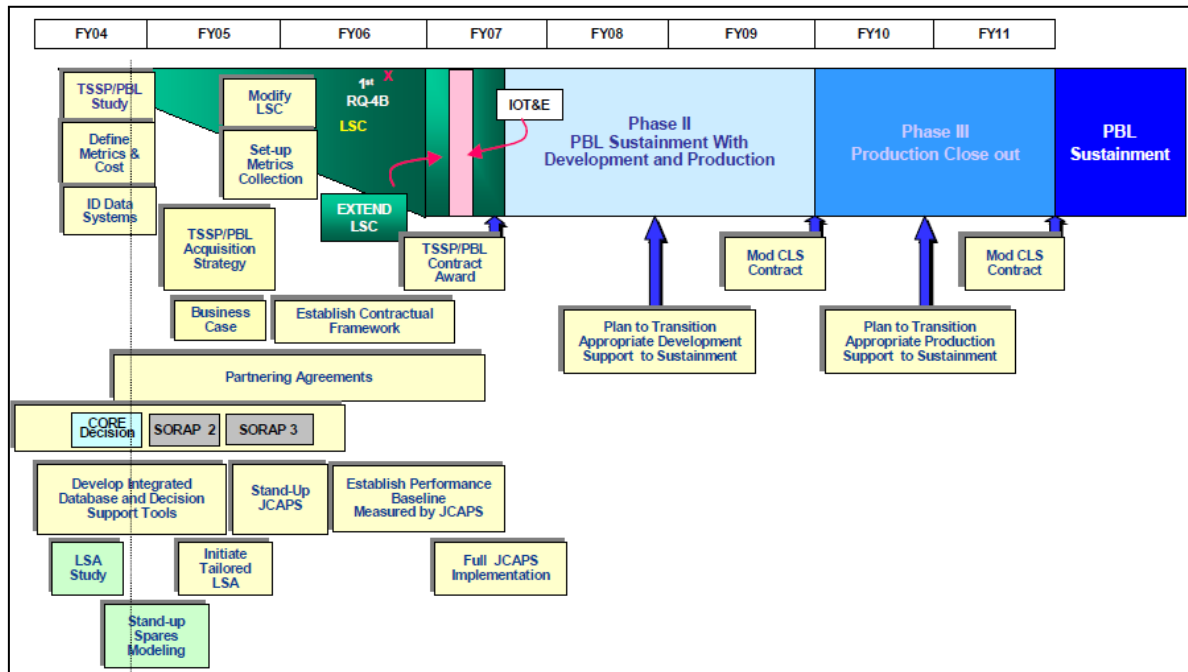


Figure 6. Global Hawk Sustainment Roadmap. (Pettingill, et al, 2004, p.21).

In F-22A Raptor program, metrics took two years to mature at the beginning of the program (Burkett, 2008, p.3). These are examples of ‘the earlier the negotiations begin the better metrics we came up with.’

As experienced by Navy, in H-60 FLIR program the contract’s performance metrics should be aligned to end-user applicable metrics (Lessons Learned, 2004, p. 3).

The F-117 PBL program which is established between AF and Lockheed Martin has “7 top level objective metrics that optimize system availability and readiness, as well as 4 subjective metrics that pertain to overall support management efficiency” under award portion (Vitasek, et al., 2006, p.5). Lockheed Martin took over the entire scope of support for the aircraft, with operational readiness targets as contract success measures (Blumberg, 2006a, p.58). This



program is considered a metrics' best practice, due to the effort of weighting and refining the most important performance metrics. On the other hand some of the metrics used in this program cannot be identified as linked with desired outcomes for overall aircraft availability or other DoD PBL outcomes, "i.e., system reliability, total operating costs, logistics response time, and logistics footprint." (Pettingill, et al, 2004, p.15-23) Although this is a 'lessons learned' issue, this program won a DOD PBL award for the most successful systems level PBL in 2005.

Boeing is contracted as C-17 nose to tail supporter for Air Force. Sustainment partnership, aircraft availability performance metric, customer satisfaction ratings, and target cost are aligned with profit of PSI. "For example, Boeing cannot overstock its logistics pipeline to ensure that aircraft remain mission capable without considering inventory procurement and carrying costs." This program is considered as the best example of a contract, tying performance to an overall availability metrics according to Pettingill, et al. (2004, p.18).

In C-130J Sustainment PBL program stockage effectiveness, customer wait time, mission capability hours are measured as the supply chain metrics. Sustaining engineering response time is also measured to track the timeliness of the response. And upon all stands the customer satisfaction. Mission capability is not a metrics, because this partnership is not responsible for the whole nose-to-tail supply chain (Blumberg, 2007b, p.6). Therefore responsibilities are set clearly. In addition, the metrics are planned to be changed by timeline according to customer needs. PSI is "incentivized sustaining engineering and customer satisfaction in Year One. Supply chain efficiency metrics will be phased in at the beginning of Year Two." (Blumberg, 2007b, p.6)

Sols and Verma (2007, p.40-46) give an example from business life; the Spanish railway state company RENFE has contracted CAF, for the support of regional TRD trains, on certain

operational performance measures, such as availability and mission reliability. But due to “ill definition of the effectiveness metrics and of the domain of responsibility of each party” conflicts have been experienced. It is an obligation; desired outcomes should be determined appropriately and do not let any misunderstandings. In this PBL program they used “operational availability (the trains are to be ready for departure at specified times) and mission reliability (the trains should arrive at their destination stations on time, provided they departed from the origin stations on time)” In some cases trains experienced delays which are not caused by contractor’s fault but decrease performance by means profit and caused conflicts.

They also give a good PBL example regarding metrics about C-212 and CN-235 in South America; PBL is arranged regarding certain fleet availability. Aircraft status has been set as:

- “- Operational (ready to fly)
  - Under planned maintenance (not ready to fly, but its unavailability is accepted due to already programmed preventive maintenance actions)
  - Aircraft on ground (aircraft not available due to failure of systems or equipment that need to be repaired; the contractor is responsible)
  - Under maintenance (aircraft not available due to failures induced by the system user; client responsible).” (Sols and Verma, 2007, p.44)

Vitasek and Geary (2007, p.4-5) use a PBL program example from software industry. In a traditional acquisition approach, customer and supplier suffers from outsized inventory costs. In PBL environment and especially where understanding and “agreement about the software giant’s desired outcomes” are provided; supplier utilizes a better capacity, customer’s service level, satisfaction, fill rate goes up, and inventory and obsolescence goes down.

Vitasek (2007) uses ‘aircraft tire PBL program with Michelin’ when describing the need of aligning desired outcomes with metrics in the conference.

In Blumberg’s (2007a, p.44) study, Vitasek states that using many metrics will make you lose focus, emphasis; but using five or less will show progress to meet objectives. According to

her one of the success key is having few metrics; 5 or less (Blumberg, 2007b; Vitasek and Geary, 2007). Steven Reid from AAI (Shadow UAV PBL program's PSI) acknowledges this statement due to the achievements of meeting/exceeding availability goals. Vitasek (2007) used C17 sustainment PBL program (about 5 metrics) and radar sustainment program with Rapheon (1 metrics; operational availability) as good examples of using few metrics and stated that the less number and the 'more broad you described the metrics' is better.

Devries (2004) finds that performance based metrics are enabler and have a positive effect in implementation of PBL. To use this enabler effectively partners should work closely and link those to desired outcomes. Although it is one of the biggest five challenges identified by the PBL Survey respondents, according to Newsome (2008, p.4), customer requirements are the most important thing to be determined clearly, without any misunderstanding.

Literature suggests using high/top-level metrics; operational availability, operational reliability, cost per unit usage, logistics footprint and logistics response time and using them as broad as it can be. Also Goure (2010) supports that and adds, two of the factors in Navy's success are focusing on availability, reliability, obsolescence and cost; and the establishment of specific, appropriate performance metrics. In the simplest way of using metrics according to the level of PBL, as Canaday (2006, p.1) describes:

“Level 1: Components, for example aircraft tires. Performance is the consistent and timely delivery of needed components.

Level 2: Major subsystems, such as aircraft engines. Availability is the main performance metric here.

Level 3: Entire aircraft. Availability is the goal.

Level 4: Mission Capability. Defense officials eventually may pay private firms for providing both readiness and steady enhancements in capabilities for military aircraft.”

As a result PBL is buying the desired outcomes which should be determined clearly after detailed negotiations. According to Sols and Verma (2007, p.40);

“... in order for a PBL contract to yield the desired results it is essential to have a thorough agreement on the metrics to be used to represent system effectiveness, as well as an agreed reward scheme that links reward to achieved effectiveness.”

PBL is moving from transactional through operational acquisition. Fowler (2010, p.18) states that:

“...Product Support for the 21st Century, the DoD strategy for product support has been evolving from traditional transactional logistics concepts— in which the components of readiness are acquired as discrete unit transactions—to a stronger emphasis on acquiring the operational readiness outcomes themselves.”

Consequently well-defined metrics is one of the keys for PBL’s success.

### **3. Performance Improvement**

In fifty two out of eighty one documents, performance improvement is mentioned regarding PBL with an emphasis on it. DoD’s one of the intents in inventing PBL is maximizing, improving, optimizing performance. According to Gansler et al. (2011); PBL is a useful tool against ‘death spiral’. In addition to cost efficiency, operational performance became one of the most important metrics of DOD’s acquisition programs especially in areas of support and sustainment (Owings, 2010).

PBL is mandated as an acquisition method whenever feasible to maximize performance (Memorandum: Performance-Based Services Acquisition, 2000; Blumberg, 2006a; Fowler, 2009). “The primary objective of Defense acquisition is to acquire quality products that satisfy user needs with measurable improvements to mission capability and operational support, in a timely manner, and at a fair and reasonable price.” (DoDD 5000.01, 2003, p.3; Pettingill, et al., 2004, p.iv) DoD shows adequate emphasis on ‘optimizing total system availability’ as a PBL goal in its definition (Pettingill et al., 2004, p.1; Hedden, 2005, p.3; Vitasek, et al., 2006, p.7; Kobren, 2010, p.193).

PBL is a transition from on production and end-item delivery to long-term product availability and sustainability. PBL is “maximizing asset uptime or operational performance.” (Newsome, 2008, p.2; Kim, Cohen and Netessine, 2006, p.1) For the win-win solution of PBL; PSI should find ways to engineer improvements (Geary and Vitasek, 2005; Kratz and Buckingham, 2010a).

According to DoD PBL guide; all PBL agreements should include reliability growth targets. Sols and Verma (2007) states that while supportability aspects are considered in contracts; contractor will prepare and conduct a reliability growth program. These are the cases where reliability is the desired outcome of customer. One of the key elements in PBL environment is “continuous improvement of weapon system supportability”, availability (Kratz, 2001, p.12; Blumberg, 2006b, p.58; Vitasek and Geary, 2007, p.1; Goure, 2009, p.1). Mahadevia et al. (2006, p.30) state that demand for parts is reduced “through reliability growth and obsolescence management.”

In DoD’s Designing and Assessing Supportability Guide (2003, p.6) System Operational Effectiveness (SOE) is described as “dependency and interplay between system performance, availability (reliability, maintainability, and supportability), process efficiency (system operations, maintenance, and logistics support), and system life cycle cost.” With SOE approach program managers (PM) will focus on “overall objective of maximizing the operational effectiveness of weapon systems” (Designing and Assessing Supportability Guide, 2003, p.6; Kratz, 2001, p.12) Improved SOE means improved performance, means enhance system capability. PBL is developed and implemented by PM to “optimize total system availability while minimizing cost and logistics footprint.” (DoDD 5000.01, 2003, p.1-1; Kobren, 2010, p.187; Goure, 2010, p.2)

Mirazahosseini and Piplani (2011) find that “to achieve a desired availability level, the supplier has to improve the component reliability and the repair time”. Improvement is desired and to do that designing should be taken in account. The underlying principle for improvement is redesigning. ‘The earliest the emphasis on engineering design’ gives the better improvement in reliability, maintainability in the future (Trovato, 2004). “Emphasis is placed on designing for increased reliability and reduced logistics footprint and on providing for effective product support through performance-based logistics (PBL) strategies.” (DoD Designing and Assessing Supportability Guide, 2003, p.3)

Table 4. Examples used in documents – Performance Improvement.

	GE 404	APU	F/A-18	F-22	A/C Tires	F-117	HIMARS	C-17	H-60 FLIR	AEGIS	Software Co.	C-130J	UK CH47	UK NIMROD	UK TORNADO	UK FV430	Shadow UAV	ITAS	JSTARS
BAE: Guide (2010)																X			
Bellis (2001)		X																	
Berkowitz et al. (2003)																			
Blumberg (2006a)						X													
Blumberg (2006b)						X													
Blumberg (2007b)												X							
Boehk (2003)																			X
Canaday (2006)			X											X	X				
DoD PBL Guide (2005)		X																	
Fowler (2009)	X		X	X	X				X										
Gansler, Lucyshyn, Harrington and Corl (2011)	X	X	X	X	X				X				X						
Geary (2006)			X			X		X		X									
Goure (2009)				X															
Goure (2010)	X	X	X	X			X	X										X	
Goure (2011b)								X											
Mahadevia, Engel and Fowler (2006)					X														
Marietta (2008)				X															
Ott (2008)	X						X												
Owings (2010)																	X		
Sols and Verma (2007)																			
Vitasek and Geary (2007)											X								
Vitasek and Geary (2008)									X										
Vitasek, Cothran and Rutner (2006)	X		X		X	X				X									
Vitasek, Cothran and Rutner (2007)	X	X					X												
Vitasek, Geary, Cothran and Rutner (2006)	X	X									X								
Total	7	6	6	5	4	4	3	3	3	2	2	1	1	1	1	1	1	1	1

Twenty four documents used examples to describe the importance of performance improvement in PBL. Table 4 shows the examples used by corresponding documents.

#### ***Navy/GE F404***

This program is considered to be a huge success. This program achieved 92% availability at first (Vitasek et al., 2006, p.4; Goure, 2011, p.7). Fowler (2009, p.6) and Gansler et al. (2011, p.15) declare a 46% availability improvement. In the first 2 years, component availability goes up to 99% from 50%, fleet backorders have been reduced to 0 from 718, and repair turnaround time goes down to 47 from 120 days and the life expectancy is increased by 20% (Vitasek, et al., 2007, p.22; Vitasek, et al., 2006, p.8; Ott, 2008, p.61).

#### ***NAVICP: APU***

“The contract provides 30 percent to 60 percent reliability improvement guarantees, 2-day delivery guarantees for high-priority requirements, obsolescence management, product support engineering, and surge capability up to 120 percent of annual flight hours. ... awaiting parts reduced from 232 to 0, backorders reduced from 125 to 0, supply materiel availability increased from 65 percent to over 90 percent, over 75 reliability improvements, and 98 percent of requisitions received during Operation Enduring Freedom filled within contractual requirements despite a 60 percent increase in demand.” (Performance Based Logistics: A Program Manager’s Product Support Guide, 2005, p.5-6)

In August of 2005, this program was awarded due to the improvement achievement from 65% in 2000 to 97% and spares inventory levels decreased 25% recently (Vitasek, et al., 2007, p.21; Vitasek, et al., 2006, p.8).

According to Bellis (2001, p.19) material availability for APU improved to the target; 90% from 67 % and component reliability improvements are as good as material availability improvements.

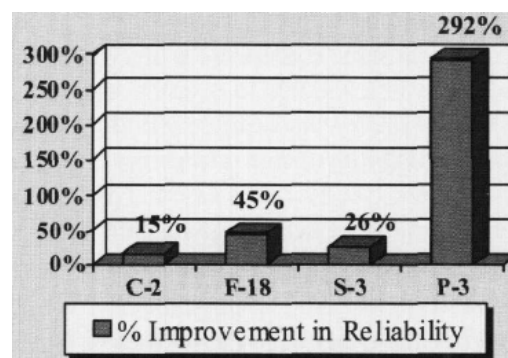


Figure 7 APU Component Reliability (Bellis, 2001, p.19).

Figure 7 shows component reliability improvements for APU.

From July 2000 to October 2002, the number of APUs awaiting depot repair is gone from 118 to 0, backorders from 125 to 26, average delivery time from 35 days to 5.4 days (Gansler, et al., 2011, p.75). Recent studies show that “availability is now 95 percent. Back orders have been eliminated and wait time reduced from 35 days to 5.” (Goure, 2011, p.5; Gansler, et al., 2011, p.v)

### ***F/A-18E/F Integrated Readiness Support Teaming (FIRST) Program***

“The mission capable rate for the F/A-18E/F improved from 57 percent in 2001 to 73 percent in 2007 and the program increased aircraft availability from 67 percent to 85 percent.” (Goure, 2010, p.5) In the traditional approach the overall availability rate was 73%; PBL achieved a rate of 85% eventually (Sols and Verma, 2007, p.47). For the material availability PBL achieved a rate of 85% from 67% (Vitasek, et al., 2006, p.2; Geary, 2006, p.78). According to Canaday (2006, p.3) “... time on repairs has been cut 33 percent, Hornet readiness is the highest among the U.S. Navy's tactical aircraft, mission-capable rates are up 20 percent”. Fowler (2009, p.6) and Gansler et al. (2011, p.15) state 23% availability improvement for F/A-18E/F aircraft.

### ***F-22 Raptor***

This program was awarded in 2008 for “for producing the highest readiness rates in the program's history.” (Marietta, 2008, p.1) Fowler (2009, p.6) and Gansler et al. (2011, p.15) state 15% availability improvement. In addition these mean time between failures (MTBF) increased by 69%, mission rate improved by 15%, repair time reduced by 20% (Marietta, 2008, p.1; Goure, 2009, p.1). In a more recent study Goure (2010,p.7) states that “aircraft availability improved by nearly 20 percent.”



## ***NAVICP: Aircraft Tires***

By this PBL program, availability requirements are met over 98% of the time and delivery time is 1 day in average where at most 2 days is required. .” (Vitasek, et al., 2006, p.4)

According to Mahadevia et al. (2006, p.31) “on time tire delivery from 86 percent to 96.4 percent, and sustained performance remains in the high 90s.” Figure 8 shows the fill rates of this program by time. On the other hand backorders are gone, “overall tire inventory has been reduced by 66% at the retail level and 92% at the wholesale level.” (Vitasek, et al., 2006, p.4). Since the beginning 100% fill rate is sustained. This caused 75% reduction in retail level of inventories in US Navy (Mahadevia et al., 2006, p.31). Figure 9 shows the inventory levels at retail.

Fowler (2009, p.6) and Gansler, et al. (2011, p.15) state that 17% availability improvement is experienced by this program.

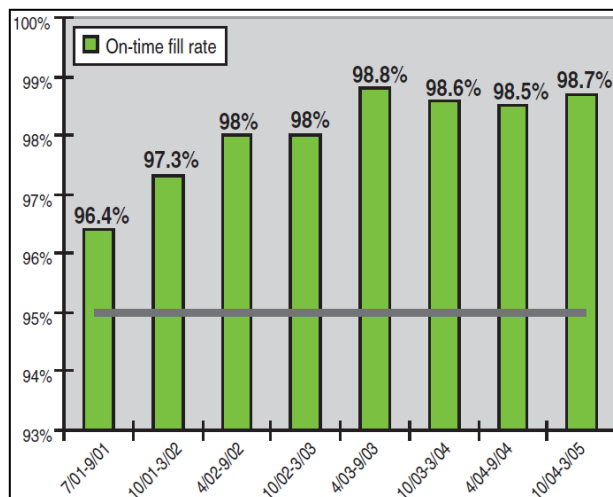


Figure 8. A/C Tires On Time Fill Rate (Mahadevia, et al., 2006, p.31).

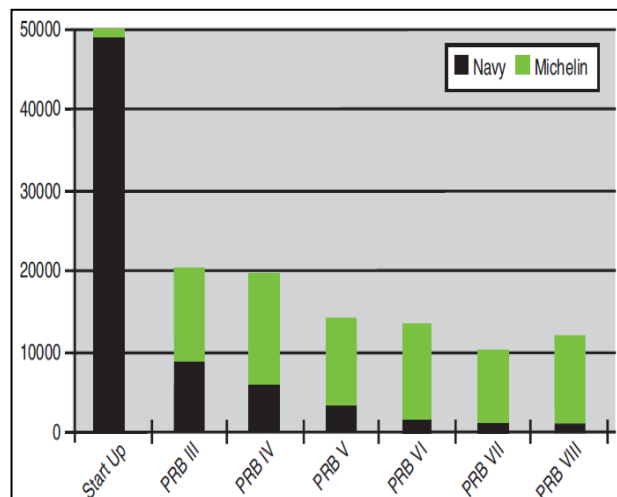


Figure 9. A/C Tires Inventory Level at Retail (Mahadevia, et al., 2006, p.32).

## ***F-117 Nighthawk and Engines***

Lockheed Martin has achieved improved mission readiness in the F-117 by reducing “response time from 80 hours to 23.4 hours and engineering disposition response time from 190

hours down to a mere 2.1 hours. This is the equivalent of the Air Force having one additional aircraft available per day.” (Vitasek et al., 2006, p.5; Bloomberg, 2006a, p.59).

For engines, Pratt & Whitney agreed to keep a specified number of engines at a specified location and paid for engine cycle according to the PBL contract. From 2000 to 2005, 85% increase is experienced for the engines’ ‘time on wing’ (the interval between service events that require an engine’s removal from the wing) (Geary, 2006, p.78). According to Blumberg (2006b, p.62) achievements are spectacular within this PBL program:

“A P&W spokesperson, Heather Summerer, said that with continuing upgrades under PBL contracts, the time on wing for the F117 engine has increased 215 percent over the past 8 years. She also reported that turn times have been decreasing: 25 percent for engines and 43 percent for LRU (line replaceable units).”

### *Other Examples*

**High Mobility Artillery Rocket System (HIMARS):** This PBL program includes 3 performance metrics. In a short period PSI met these metrics with 99+% System Status Readiness against a goal of 92%; a mission capable turnaround time of one hours against a goal of 96 hours, and a repair turnaround time of two days, against a goal of five days (Vitasek, et al., 2007, p.23; Goure 2010, p.6). Ott (2008, p. 61) supports this in his study with project manager’s statement:

“Lockheed Martin HIMARS field service representatives are serving in Iraq and Afghanistan. ‘You almost can’t increase availability,’ says Col. David Rice, project manager for Precision Firing Rocket and Missile Systems in the Program Executive Office for Missiles & Space at Huntsville, Ala. It is hitting 99.98%, he said.”

**C-17 Globemaster:** By this program high MICAP rates is achieved with performance extensions (Geary, 2006, p.78; Goure 2010, p.7). Major ‘aircraft availability improvement’ is experienced (Goure, 2011b, p.2).

**Forward Looking Infrared (FLIR) for H-60:** From beginning of this PBL program in October 2003, 100 percent availability rate, 40 percent growth in system reliability improvement and a 65 percent repair response time improvement are experienced (Vitasek and Geary, 2008, p.63). Fowler (2009, p.6) and Gansler, et al. (2011, p.15) state 14% availability improvement in this program.

**Aegis Cruiser:** This PBL program is another success. Its material availability increased from 62 % to 94 % (Geary, 2006, p.78; Vitasek, et al., 2006, p.2).

**Major Software Company:**

“In the software business, matching supply with demand is notoriously difficult. Frequent product revisions make the job even tougher. And yet, missing a peak-season selling opportunity or product launch is disastrous because the margins are so high. A typical product costs less than \$5 to make, but software applications can sell anywhere from \$50 to several hundred dollars.” (Vitasek, et al., 2006, p.8)

The firm found the exit way in PBL. As a result the company “maintained a 98% service level rate at the new 48- hour cycle time, and cut inventory to less than 7% — a whopping reduction of 27%.” (Vitasek and Geary, 2007, p.5; Vitasek, et al., 2006, p.8)

**C-130 J:** According to Blumberg (2007b, p.8), metrics of a component to a fleet activity relative to the engine goes up to 95 % from 43%, turn times reduced by nearly 30%, back orders are reduced from 718 to 0 in 15 months.

**U.K. CH-47 Chinook:** This PBL agreement is between Boeing and UK Ministry of Defence. “The program has exceeded all expectations, pushing the ‘mission capable’ rating to 90 percent, 15 percent higher in each of the last three years than was anticipated.” (Gansler, et al., 2011, p.24)

**U.K. Nimrod:** One of the pilot PBL programs in U.K. is supporting Nimrod aircrafts. By this program aircraft availability is increased by 8% (Canaday, 2006, p.2).

**U.K. Tornado:** “At one Royal Air Force base, CS&S reduced Tornado downtime by 35 percent and man-hours by 40 percent. Tornado radar support now requires 50 percent less inventory, and costs are down 45 percent.” (Canaday, 2006, p.2)

**U.K. FV430 Armored Personnel Carriers:** “...British Army FV430 armoured personnel carriers received a new engine and drivetrain to bring them up to ‘Bulldog’ specification. The upgrade extends the useful service life of the platform by 20 years, greatly increases performance and reliability and significantly reduces support costs.” (BAE: Total Performance, 2010, p.8)

**TOW Improved Target Acquisition System (ITAS):** “According to the Army, the PBA to support the improved target acquisition system (ITAS) for the TOW missile has provided better than 90 percent availability over the past seven years” (Goure, 2010, p.7).

**Shadow Unmanned Aerial Vehicle (UAV):** According to Owings (2010, p.16) system status readiness goes up to 90% and above since 2008 and reliability growth rate duplicated itself regarding 2006-2008 data , depot mean down time is less than 60 days.

**E-8C Joint Surveillance Target Attack Radar System (JSTARS):** In Afghanistan JSTARS flew all missions and by PBL increased its availability for training to 99 percent from 2001 to 2002 (Boehk, 2003, p.1).

As seen from the examples; one of the key successes of PBL is improving performance.

“PBL has been proven to be effective as a means of purchasing higher quality results at lower cost to the government by allowing defense contractors to utilize industry best practices. Facts show that the use of PBL can bring extensive improvements to a weapon system, while lowering costs and increasing reliability and availability” (Vitasek and Geary, 2008, p.65)

Bellis (2001, p.19) states that higher material availability, less delivery times, increased reliability, timely resolution of obsolescence issues, improved readiness make PBL a way of life.

According to Bozkurt and Guducu (2005, p.19) one of the main objectives of the PBL can be described as: “Maximize Performance: The contractor can deliver the required service by following its best business practices, adjusting them accordingly. The contractors can be incentivized to use their best performance.”

It is so clear that PBL works and delivers improved performance in various ways (Fowler, 2009, p. 7; Kratz and Buckingham, 2010b, p. 293). According to Spring (2010) the efficiency and effectiveness of military logistic system can be improved by PBL.

Consequently one of the successes of PBL is improving performance.

#### **4. Partnership, Strategic Alliance**

In forty nine out of eighty one documents, partnership, alliance is mentioned regarding PBL with an obligation. “The complex systems found in aerospace and defense require more sophisticated relationships between service buyers and suppliers.” (Cohen and Netessine, 2007, p.2) DoD’s aim is to get improved performance within a fair cost through PBL.

“Today, the DoD’s goals are not only to gain the most efficient and effective performance of systems throughout their entire life cycles, but also to build partnerships and relationships that align the goals of all involved organizations for the duration of the programs.” (Gardner, 2008, p.9)

PBL environment is enclosed by long term, strategic partnership. Without it PBL cannot be even described.

“Companies that are considering PBLs should realize that they are entering into de facto partnerships with their logistics services providers and that these partnerships cannot be created overnight.” (Vitasek and Geary, 2007, p.1)

Partnership, strategic alliance is not just a business relationship in PBL. Traditional approach can be called as arm’s length relationship. According to Ott (2008); it is a new level, partners are developing better relationships.

“Contractual relationships that are largely transactional, involving very little integration of operations between DoD and smaller support providers, are generally not considered to be performance-based contracts and tend to fit the category of “arm’s length relationships” as described by Lambert et al. (1996).” (Gardner, 2008, p.10)

Many relationships are moving towards long term partnership from traditional arm’s length approach. According to Nicosia and Moore (2006); this is a development to improve relations through strategic alliances. They also stated that long term strategic partnership is a key for supply chain management.

“In the PBL environment, a Government/industry team is a key long-term relationship that is developed among public and private stakeholders contractually and/ or with performance agreements.” (Performance Based Logistics: A Program Manager’s Product Support Guide, 2005, p.1-1)

The definition of PBL in DoDD 5000.01 (2003, p.7) includes partnership. “Sustainment strategies shall include the best use of public and private sector capabilities through government/industry partnering initiatives, in accordance with statutory requirements.” To have a successful PBL, partnership is an obligation. Best practices include “Government-Industry partnerships, consistent with contract documents.” (DoDD 5000.02, 2002, p.31) These definitions are cited by Berkowitz, Gupta, Simpson and McWilliams (2004). Dibenedetto (2007) describes this concept as an effective, collaborative partnership. Heron (2010) believes that this partnership is a tie for PBL, a part of PBL. Therefore it should be mandated in PBL.

Bozkurt and Guducu (2005) think that forming a long term relationship is the intent of PBL. PBL may “increase weapon system readiness through cost-effective, integrated, logistics chains and public/private partnerships.” (Gansler, et al., 2011, p.6)

According to Devries (2004) one of the seven enablers of PBL is strategic alliances/partnerships. Buyukgural (2009), Bozkurt and Guducu (2005), Gardner (2008) and

Vitasek et al. (2007) cites Devries (2004) research results in their studies to explain the key drivers of PBL. Vitasek et al. (2006) declare public-private partnerships as a key component of successful PBL. “A contracting strategy developed in partnership with the contractor ...” is one of the success factors according to Kate Vitasek (Blumberg, 2007b, p.5).

Slinkard and Poleskey (2006) accept that award-term contracting is a good way to incentivize long term relationships. According to them leading partnerships is the win-win solution. The full promise of a carefully structured PBL can only be achieved with partners integrated into a final solution set. There should be a mutual understanding of corresponding goals (Trovato, 2004, p.23). Burkett (2008, p.1) states that “Buyers don’t just want a product or a service but a relationship with a partner that provides a total value solution.”

PBL contracts are unique partnerships to meet the goal. “Contractors often enter into unique partnerships with DOD facilities to achieve readiness and cost goals.” (Blumberg, 2006b, p.58) Therefore best service, practice, utility are experienced (Blumberg, 2007a, p.42). Miller (2008) sees PBL as an alternative strategy to have best commercial practices, skills in order to have effective, efficient support.

It is important to be aware of strategic partnership relations. Education improves the will to build these relationships. Maylett and Vitasek (2008) believe that, sessions regarding these kinds of relationships will improve strategic partners’ knowledge and abilities.

According to Fowler (2009, p.5) DoD’s PBL framework includes “public- and private-sector provider strategies, with partnering being an integral component of PBL approaches”. But even more, “the next-generation PBL strategies need to offer improved attention to the enterprise integration effects.” Kratz and Buckingham (2010b) believe that all future acquisition strategies

depend on successful partnerships. Spring (2010) suggests encouraging and reinforcing these partnerships to improve PBL and those other future strategies.

In Newsome's (2008, p.12-14) study, survey participants make comments on partnership, relationship. Some of them are below:

“General industry trend however we are moving to alliance contracting with an increasing number of our customers. ... We are Public Partners in Several Public/Private PBL agreements. ... Almost six years of good experience. Predictability of costs. True partnership with supplier.”

Thirteen documents give following examples to suppress the importance of partnership.

Table 5 shows the examples used by corresponding documents.

Table 5. Examples used in documents– Partnership/Strategic Alliance.

	H-60 FLIR	C-17	JSTARS	F-22	F/A-18	APU	A/C Tires	Shadow	C-130J	GE 404	JAVELIN
Berkowitz et al. (2003)	X	X	X		X						
Blumberg (2006b)	X										
Blumberg (2007b)								X	X		
Bozkurt and Guducu (2005)	X	X	X		X						
Goure (2009)		X		X							
Kratz and Buckingham (2010b)		X		X							
Mahadevia, Engel and Fowler (2006)							X				
Marietta (2008)				X							
Ott (2008)										X	
Slinkard and Poleskey (2006)			X								
Spring (2010)											X
Vitasek and Geary (2008)	X										
Vitasek, Cothran and Rutner (2007)						X					
Total	4	4	3	3	2	1	1	1	1	1	1

**H-60:** Sikorsky Aircraft Corporation is responsible as PSI in this PBL program.

“Sikorsky Aircraft Corporation (SAC) is working side by-side with Corpus Christi Army Depot (CCAD) to reduce repair/overhaul turnaround time for the H-60. This joint collaboration has improved business processes, depot repair methodology, and more responsive product support, with only four contractor jobs directly attributable to the partnership.” (Berkowitz et al., 2003, p.17; Bozkurt and Guducu, 2005, p.60)

MHSCo is the joint venture company of Lockheed Martin/Sikorsky which has partnered with Navy for this PBL program. This is a unique partnership according to Blumberg (2006b). In



addition to that for FLIR systems of H-60, Raytheon is responsible “for supply chain management, configuration management, and total system performance.” (Vitasek and Geary, 2008, p.63)

**C-17 Globemaster:** This PBL is an agreement of Boeing-Air Force partnership. “Boeing has direct-sales partnership agreements with each of the three Air Logistics Centers.” (Goure, 2009, p.1) “They have joint weekly, monthly, block, etc. meetings and reviews. Every employee who works on the C-17 wears a plastic card the size of their badge, imprinted with partnership agreement signed by Boeing and Air Force leaders.” (Berkowitz et al., 2003, p.17; Bozkurt and Guducu, 2005, p.60) They used these badges to implement the idea of alliance.

**E-8C Joint Surveillance Target Attack Radar System (JSTARS):** According to Berkowitz et al. (2003), Bozkurt and Guducu (2005); there are multiple agreements in place for Total System Support Responsibility partnership in this PBL program. Slinkard and Poleskey (2006) takes JSTARS PBL program as a good example of long term relationship in supply chain management.

**F-22 Raptor:** Lockheed Martin sees this PBL program as a strong partnership. “The government-contractor team is a strong partnership providing rapid maturation of the F-22 support system and exceptional support to the warfighter; said Dennis Haines, Lockheed Martin vice president for F-22 Sustainment.” (Marietta, 2008, p.1) Goure (2009) pointed out that this program won the DoD 2008 PBL System Level Award and achieved various performance improvements by public-private teams and partnership.

**F/A-18E/F Integrated Readiness Support Teaming (FIRST) Program:** According to Berkowitz et al. (2003 p.17), Bozkurt and Guducu (2005, p.60); “fifty-seven government jobs were created or sustained by this partnership.”

**Auxiliary Power Unit (APU):** Vitasek, Cothran and Rutner (2007) believe that the success in APU PBL program has been provided by Navy and Honeywell partnership. Not only the improvements but also the benefits stated in their study are the products of this partnership.

GAO Report of Depot Maintenance (2008) states that there are various benefits of building closer relationships. These benefits are explained in details for both studies.

**Aircraft Tires:** Michelin, Lockheed Martin, and EGL are integrated to support this PBL program. “Michelin, Lockheed Martin, and EGL are integrated through a Lifetime Support Command Center (LSCC) that controls all requisitions from the fleet and provides warehouse management, inventory control, and data to Michelin to maintain their internal systems with program data.” (Mahadevia, et al., 2006, p.31)

**Shadow Unmanned Aerial Vehicle (UAV):** AAI and Army are partners in this PBL program. The partners worked even at war zone in Iraq. According to Blumberg (2007b) this is the most unique event among PBL programs.

**C-130 J:** AAD is partner with Rolls-Royce and Lockheed Martin in this program. Wayne Ayer, Director of C-130J Sustainment, 560th Aircraft Sustainment Squadron, states that “It's a partnership, where we rely both on the contractor and the DOD, so we calculate his contribution to aircraft availability separately from the DOD's contribution.” (Blumberg, 2007b, p.6)

**Navy/GE F404:** Navy Capt. Tim Matthews, commander of the Fleet Readiness Center Southeast, formerly the Jacksonville, states that “I talk as a provider of touch labor facilities and as a subcontractor to GE. That’s an interesting relationship for a military man to be in.” (Ott, 2008, p.60)

**JAVELIN:** Lockheed Martin and Raytheon are partners with Army in this program. According to Spring (2010); although some of the depot staff sees those contractors threat to the

security, more begins to think as contractors are one of them or they are one of the employees of the contractor.

Building trust is mentioned in most of the documents which include partnership. According to Buyukgural (2009, p.39) “Building the trust and partnerships between parties is an important aspect of PBL”. Gardner (2008, p.10) references Lambert (1996) regarding trust in partnerships and states that; “A partnership is a tailored business relationship based on mutual trust, openness, shared risk, and shared rewards that yields a competitive advantage, resulting in business performance greater than would be achieved by the firms individually.” According to Canaday (2006); developing trust between partners should be the first step for making the PBL work.

Lambert’s classification of business relationship has 3 levels, types. Type 1 is beginning from slightly more than arm’s length to type 3 is the highest level of partnership. According to (Gardner, 2008, p.12):

“... most PBL contracts between DoD and the major defense contractors seem to fit into the category of Type II partnerships, defined as follows: The organizations progress beyond coordination of activities to integration of activities involving multiple divisions and functions within the firm. Although not expected to last ‘forever,’ the partnership has a long-term horizon”

As stated before; partnership, long term relationship is a key for PBL regardless of the level or stage. It is even in level 1 as in APU PBL program. As Goure (2010, p.2) states “Enough evidence exists to say that public-private partnerships are a good way to integrate the organic and private defense industrial bases.” PBL is used for readiness, improving performance, availability. If it is the purpose, the only way to ensure it, is committing to a long-term relationship, partnership, strategic alliances (Goure, 2010, p.14). This is the only and best way to use both partners’ capabilities to achieve the best results.

## **5. Length of Contract**

In forty one out of eighty one documents, length of contract is mentioned as an important factor in PBL. “The preferred PBL contracting approach is the use of long-term contracts with incentives tied to performance.” (Performance Based Logistics: A Program Manager’s Product Support Guide, 2005, p.3-19; Bozkurt and Guducu, 2005, p.15; Blumberg, 2006a, p.57) This preference is so clear for DoD when implementing PBL strategy. To improve performance, to reduce cost, and to achieve better results, contractors should invest money. The intent when investing is taking it back as profits in the future. “This can only be achieved when there is sufficient contract length to assure the service provider of an adequate return on investment for these actions.” (Performance Based Logistics: A Program Manager’s Product Support Guide, 2005, p.3-19) Kobren (2010, p.187) adds “long-term best value sustainment strategies that bring a balance between readiness and cost” should be ensured for performance objectives. DoD’s plan is having a long term support. ‘Long term support’ is listed in Kratz’s (2001, p.14) study as one of the product support planning objectives that should be met at a minimum.

“PBL arrangements focus on the purchase of measurable performance outcomes (such as the availability of functioning weapon systems) through long-term support arrangements rather than the purchase of individual elements of support—such as parts repairs, and engineering support” (Gansler, et al., 2011, p.6; GAO Report: Performance-Based Logistics, 2008, p.1; Goure, 2010, p.1; Mirazahosseini and Piplani, 2011, p.256)

The contracting, planning, upgrading processes, themselves take much time. According to Hedden (2005); improving reliability depends on upgrades (including long term planning) which consume a long period of time.

Garnder (2008) states that the most incentive factor is contract length for balancing risk and up-front investment in PBL. Developing long term relationships is only possible with longer

contracts. Kim et al. (2006) think that in the long run contractors may show interest to invest for more reliable, improved products, service.

“... the PBL goal of developing long-term partnerships that encourage investment from commercial partners is best achieved through lengthy, guaranteed contracts ... At various recent PBL conferences and seminars, private industry representatives have consistently expressed that contracts of shorter term lengths limit defense contractors’ ability to realize worthwhile return on investment” (Garnder, 2008, p.iv)

According to Kobren (2009) long-term contracts allow contractors to balance risk against their investments. “A performance-based contract’s length is tied to the ‘payback period’ for the service provider to recoup its investments.” (Dibenedetto, 2007, p.38)

Gardner’s (2008, p.42) study shows that:

“A consistently high level of satisfaction with contract length was found amongst programs that had contracts with a 5-year base, followed by option years or award terms. Respondents in these cases expressed that the contract length allowed for an appropriate amount of risk sharing and return on investment.”

Cebeci (2009, p.22) cites a RAND study and states the advantages of multi-year contracting:

“... the avoidance of nonrecurring costs associated with negotiating and implementing a new contract each year, long-term hiring and personnel planning can be made more efficient, and the contractor can plan the purchase of long lead items and materials longer production runs.”

While Cebeci (2009) is listing the benefits regarding costs, DoD PBL guide and Vitasek et al. (2006) state that long term contracts provide cash-flow continuity and “time horizon sufficient to allow contractor investment to improve products and processes, confident that they will receive an adequate Return on Investment.” (Performance Based Logistics: A Program Manager’s Product Support Guide, 2005, p.3-34; Sols and Verma, 2007, p. 44; Vitasek, et al., 2007, p.7) Vitasek et al. (2007) see PBL, regarding long term contracting, as an opportunity to plan future workloads, requirements and manage obsolescence better. These benefits incentivize

contractors to win longer contracts rather than short ones. Gansler et al. (2011, p.12) count long term contract as a benefit by itself among the partners.

Berkowitz et al. (2004) define PBL in their study and emphasize that contractual mechanisms should have long term relationship. Regarding the definitions used by DoD and its branches; Pettingill, et al. (2004, p.7) criticize Army and Air Force not using the ‘long term performance based agreement’ in PBL definition; while Navy definition “specifically mentions the importance of long-term arrangements”. In their study, AFLMA’s proposed definition has adequate emphasis on long term contracting.

According to Lessons Learned (2004) Navy suggests long term partnering in their business case analysis, especially to get early commitment and investment. The use of long-term contracts is listed among the reasons Navy cites for its success with PBL (Goure, 2010, p.4). Recent studies show that DoD is relying more and more on long term strategic relationships day by day. Also GAO reports make the same conclusion (GAO Report: Performance-Based Logistics, 2008).

Successful PBL programs are the ones with longer contracts. Vitasek states that one of the common factors for success in PBL is long term contracts (Blumberg, 2007a, p.44). Contract length should be examined carefully because it is a key for success. Contract length is listed under PBL Contract Structure Elements in Vitasek’s lecture and thought by her as a tenet in PBL’s success (Wuchenich, 2008, p.3). Owings (2010) supports, too; to make PBL work properly long term commitment is required. “The government also sees ‘long-term support arrangements’ as a key element of PBL success.” (Gardner, 2008, p.2) It is a key to success.

All acquisitions are not fit in PBL such as short contracts. “The contract may expire without any benefit for the customer because of the short term, or the supplier may not achieve a

certain performance level because they have insufficient time to apply their skills.” (Harada, 2010, p.25)

Both organic and commercial representatives agree that 5 years for the length of contract is the base for success in PBL. Literature states ‘at least 5 years is required’ (Harada, 2010, p.31; Vitasek and Geary, 2008, p.64; Gardner, 2008, p.46; Bozkurt and Guducu, 2005, p.15). Some authors state three to five years (Gansler, et al., 2011, p.61). But it should not be less than three (Blumberg, 2007a, p.44). It is common that return on investments gets better after 5 or more years (Gansler, et al., 2011, p.61). Gardner (2008) states that long term contract are not always the answer but it usually is. Long term contracts are not the only magic that makes PBL works by itself.

GAO reports, mentioned earlier, take U.K. and its PBL experience in their studies and states more than 10 year long-term contracting is crucial. But also they cite military literature which suggests 5 years. There are some arguments regarding limitation of competitiveness, flexibility by long contracts in the literature. Kratz and Buckingham (2010a) are one of them. They think that long contracts limit government’s flexibility to adjust the real world changes and budgeting. Kratz and Buckingham (2010b) offer reducing contract length to enable continuous competition. Although they argue about so long contracts, they admit that 5 years is good.

Seventeen documents give examples regarding partnerships as a factor with examples. Table 6 shows the examples used by corresponding documents.

**F-117 Nighthawk:** This is a system level PBL contract for 5 year with 3 year option (Vitasek et al., 2006). Funding is stabilized by the government (Pettingill et al, 2004). This leads long term commitment. As stated before, this program was awarded at system level in 2005 (Vitasek et al., 2006). This program resulted many performance improvements and cost savings,

although it was one of the legacy programs that turned to a PBL (Blumberg, 2006a). All authors think this program had a success with its contract length.

Table 6. Examples used in documents– Length of contract.

	F-117	APU	JSTARS	GE 404	UK TORNADO	HIMARS	ITAS	RENFE TRAIN	F/A-18	C-17	UK NIMROD	JSF	Shadow UAV	H-60 FLIR	UK Sea King	UK Survey Ship	UK Merlin
Blumberg (2006a)	X																
Blumberg (2006b)	X											X					
Blumberg (2007a)													X				
Canaday (2006)					X						X						
Gansler, Lucyshyn, Harrington and Corl (2011)		X															
GAO Report: PBL (2008)					X										X	X	X
Gardner (2008)						X											
Geary, Koster, Randall and Haynie (2010)			X														
Lessons Learned (2004)									X								
DoD PBL Guide (2005)							X										
Pettingill, Knipper, Gaudette and Gayer (2004)	X		X							X							
Slinkard and Poleskey (2006)			X														
Sols and Verma (2007)								X									
Vitasek and Geary (2008)														X			
Vitasek, Cothran and Rutner (2006)	X			X													
Vitasek, Cothran and Rutner (2007)		X															
Vitasek, Geary, Cothran and Rutner (2006)	X	X		X													
Total	5	3	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1

**Auxiliary Power Unit (APU):** This PBL contract is a 10 year agreement; 5 year base with 5 – 1 year renewal options (Vitasek et al., 2007). It achieved several success stories and it was awarded in 2005 at component level (Vitasek et al., 2006b). Gansler et al. (2011, p.28) give this example under the title of “A 10 Year PBL Success Story”.

**E-8C Joint Surveillance Target Attack Radar System (JSTARS):** The contract is signed between Northrop-Grumman (NG) and Air Force (AF).

“The basic contract includes 6 years with the potential for 22 additional years as part of the award-term arrangement. A good working relationship exists among the AF, NG, and the warfighter. The long-term nature of this contract was identified as a best practice as it motivates an atmosphere of cooperation and long-term investment between NG and the AF.” (Pettingill, et al, 2004, p.19)



According to Geary, Koster, Randall and Haynie (2010) this PBL program is a long-term success of utilizing long term hybrid structure of partners. In their study, Slinkard and Poleskey (2006) examined JSTARS example regarding award term, its advantages and disadvantages.

**Navy/GE F404:** This is one of the best major sub-system PBL examples according to Vitasek et al. (2006). The contract is 4½ year base with 5 additional 1 year option. Improvements and savings are mentioned at previous sections. It was also awarded at its stage and all optional years were awarded to the first contractor (Vitasek et al., 2006b).

**Tornado Support in United Kingdom (U.K.):** At first this was a pilot PBL program for U.K. but now they decided to move on a 10 year contract due to the achievements (Canaday, 2006, p.2).

“According to officials, the long-term contracts for Tornado aircraft and helicopter fleets reduced costs because the contractors were able to stabilize their supply chain and obtain better prices from the supplier base. The Ministry of Defence also found that industry preferred long-term contracts. In a discussion of contracting for availability, the “Defence Industrial Strategy,” a white paper dated December 2005, stated that companies are generally interested in using availability contracts because it provides the commercial firms with greater returns over a longer period.” (GAO Report: Improved Analysis and Cost Data Needed to Evaluate the Cost Effectiveness of Performance-Based Logistics, 2008, p.49-50)

Other examples and key points are summarized in table 7.

These are the best in their stage or good examples of working PBL and as seen they have at least 3 years contract with award terms options. Consequently; contract length is an important factor and it can be stated that less than a 3 years contract may not work for PBL.

## **6. Flexibility**

In thirty nine out of eighty one documents, flexibility is mentioned as an obligation for PBL. PBL is an acquisition system where decentralization, innovation, creation are used in an

optimal way. To achieve its promises, PBL environment should “enable greater flexibility in capitalizing on commercial technologies” (DoDD 5000.01, 2003, p.7; Kratz, 2001, p.14)

Table 7. Summary of examples for Length of Contract.

	Contract Length	Key Points
HIMARS	3 yrs	High level of satisfaction with a short contract.
ITAS	5 yrs	Well structured PBL performance agreement. Several improvements.
RENFE TRAIN	14 yrs	Availability and mission reliability improvements.
F/A-18	3 yrs + up to 30 yrs	Focus on creating a long term business arrangement that will stand the test of time.
C-17	5 yrs + 3 x 1yr opt	Boeing’s efforts were considered a “PSI” best practice.
UK NIMROD	6 yrs	Increased aircraft availability, decreased costs.
JSF	Since 2001	JSF program is on target with sufficient long-range, up-front planning to provide a high probability of success.
Shadow UAV	5 yrs + 7 x 1yr opt	Shadow program meets the criteria for a PBL program that should ultimately prove to be very successful.
H-60 FLIR	10 yrs	Many improvements and cost reductions.
UK Sea King	10 yrs	Long-term nature of availability contracts a key factor in reducing costs and that annual contracts cannot achieve the same benefits as the longer-term contracts do. Commercial firms prefer so.
UK Survey Ship	23 yrs	
UK Merlin	25 yrs	

PBL is an acquisition method which pays for outcomes, not how it is delivered. A PBL, which has clearly defined outcomes, performance measures and evaluation method, allows partners “maximum flexibility to attain the greatest degree of innovation and creativity.” (Memorandum: Performance-Based Services Acquisition, 2000, p.2) Otherwise partners are limited with boundaries, ‘how to do’s. There is one way to achieve goals, ultimate purposes and it is mostly depend on flexibility.

“In a true PBL contract, the customer specifies the outcome they are expecting but not the method used to achieve that outcome, thus leaving it open to the contractor to implement commercial best practices to not only achieve the expected results but make significant improvements as well.” (Newsome, 2008, p.2)

Also FAR regulates not using ‘how to do’s. According to FAR one of the four requirements for performance based contracting is telling the contractor what is needed rather than how to provide the service (Baldwin, Ausink and Nicosia, 2005). Gansler, et al. (2011) cite FAR regulations when he is describing the need of flexibility. According to Kim, et.al. (2006, p.3) there is a clear separation between the desired outcomes and how to achieve those. “The contract explicitly identifies what is required, but the contractor determines how to fulfill the requirement.”

Major Gen. Daniel Mongeon states that Defense Logistics Agency (DLA) “buys performance as a package, which includes surge flexibility.” (Anonymous, 2005, p.33) According to him “DLA is stepping up to the plate to provide flexibility and agility to support the warfighter today.” (Anonymous, 2005, p.34)

“The guiding principle in Performance Based Service Acquisition is that when an outside vendor exists that can perform a service more effectively than a government user could organically (i.e., in-house), the government client should specify measurable outcomes to a service vendor, and allow the vendor to best determine the appropriate processes (the "how") of delivering the service.” (Doerr, Lewis and Eaton, 2005, p. 2)

In PBL buyer is trying to use contractor’s knowledge, experience, capabilities; trying to have best commercial practices. There is a necessity of freedom for contractor’s actions to do what he does best. That’s why most goes PBL from traditional approach. Traditional approach includes processes, specifications about what should be done. In PBL, just desired outcomes are specified. This is “a transition from telling the contractors what to do and how to do it, to telling the contractor what to achieve, and then relying on their knowledge and experience to do it.” (Sols and Verma, 2007, p.40; Venema, 2007, p.1; GAO Report: Improved Analysis and Cost Data Needed to Evaluate the Cost Effectiveness of Performance-Based Logistics, 2008, p.7) This is flexibility and this will provide more space for creativity, innovation. As a result the

“contractors are given the necessary freedom and responsibility to innovate and apply their domain knowledge and experience, within a context of financial motivation and incentives.” (Sols and Verma, 2007, p.49) According to Trovato (2004); PBL is an effort to shorten logistics tail of military by having contractor to achieve the goals through a flexible environment. “The requirement that performance goals be met is imposed on the supplier but is of sufficient duration and flexibility to permit the supplier to adapt his enterprise to meeting the goals.” (Spring, 2010, p.2)

General George S. Patton said that “Never tell people how to do things. Tell them what needs to be done, and they will surprise you with their ingenuity.” (Vitasek and Geary, 2007, p.3) Let them do, what they are capable of.

PBL does not have rules for contractor how to achieve the results. It does not dictate how to accomplish the desired outcomes. Traditional approach has dictation what to produce. On the other hand PBL just states what the desired outcomes are (Vitasek and Geary, 2008). PBL “does not dictate the methods or limit the contractor’s ability to determine how to do so.” (Owings, 2010, p.15) Therefore PSI has “significant latitude to exercise a creative and entrepreneurial approach to not only meet, but often exceed” these buyer’s requirements (Cothran, n.d., p.8). As long as the buyer gets what he wants, PSI has flexibility how the support is provided. According to Vitasek et al. (2006a, p.2; 2006b, p.7) this is an opportunity for PSI to decide how to provide the necessary support. And also for the government “it is a chance to it is a chance to obtain guaranteed availability improvements while decreasing costs and logistics footprint through partnering with private business for complete program support.”

Blumberg (2006a, p.57) states that buyer is not focusing on details such as “the number of contractor personnel assigned to a facility, or where that facility is located” but he is “paying

for the results produced, and the risk burden shifts to the contractor to deliver.” According to Mirazahosseini and Piplani (2011), customer just sets the objectives, it is expected from supplier to achieve them with flexibility on how to. The model they offer has flexibility, as a factor in it. “The contractor has flexibility on the details to hit the numbers.” (Blumberg, 2007a, p.44)

In addition to that for more flexibility, responsibility, authorization should be decentralized. According to DoDD 5000.01 (2003, p.3) responsibility for the acquisition of systems shall be decentralized to the maximum extent practicable. In PBL environments PSI has so much responsibility, therefore it should be empowered.

“In a PBL strategy, DoD is empowering the PSI with the ultimate responsibility – producing warfighter operational effectiveness by ensuring a continuously available, reliable, and effective system. The concepts of PBL – buying performance outcomes, incentivizing the PSI, specifying ‘what’, not ‘how’ those outcomes are achieved, all facilitate the tremendous success evident in PBL support strategies to date.” (Cothran, n.d., p. 20)

But responsibilities should be defined clearly. “The transfer of responsibilities is not risk-free, and the contractual framework has to be very well defined.” (Sols and Verma, 2007, p.40)

Authorization should be given to the provider for “flexibility to develop innovative solutions in order to achieve the client’s desired outcomes.” (Vitasek and Geary, 2007, p.6)

Berkowitz et al. (2004, p.259) like Navy’s definition because of using ‘empowered PSI’ term, granting additional power to decision maker:

“A PBL strategy is an agreement, usually long term, in which the provider (organic, commercial, and/or public/private partnership) is incentivized and empowered to meet overarching customer oriented performance requirements (reliability, availability, etc.) in order to improve product support effectiveness while reducing TOC.”

Devries (2004) defines working capital fund, various appropriations, transfer and expiring funds rules, limited Program Manager's control over Operation and Maintenance, etc. as funding restrictions/inflexibility by means a barrier for PBL.

“PBL transfers many of the ‘make or buy’ decisions to the prime support contractor, yet DoD financial rules still require government managers to include separate appropriation funding requirements in contracts – in other words forcing them to ‘estimate’ what kind of support decisions the support contractor will make, and in doing so setting arbitrary boundaries that constrain contractor flexibility to make best value decisions.” (Vitasek et al., 2006a, p.7)

Vitasek (2006a) explains the situation, which Devries (2004) defines as a barrier. Vitasek (2006a, p.8) recommends DoD to “press ahead with vigor, and work towards alleviating any remaining financial, statutory, or politic barriers that limit the full potential of PBL.” PBL will implement best commercial capabilities to DoD's ability.

Acquisition always carries ambiguity, risk within. Especially for new systems, PBL do so. Some factors may decrease their effect. According to Cebeci (2009), one of the success boosters that will help to reduce their effect is flexibility. PBL creates such an environment. Cebeci (2009, p.54) cites (Garrett, 2005):

“Performance-based acquisition creates a new acquisition environment for both industry and government by promoting flexibility and innovation and by creating win-win solutions through effective communication. It is no longer optional; it is a business necessity in both public and the business sectors.”

Because of these ambiguity and risk, contractor needs some freedom for his actions according to the determined metrics. “Contractor needs enough flexibility to invest in areas that have the best returns, and to adapt his processes to meet the objective metrics.” (Blumberg, 2007a, p.44)

Six documents used different examples to give emphasis on flexibility. The examples and key points used in corresponding documents are listed in table 8.

Table 8. Summary of examples for Flexibility.

PBL Program	Reference	Key Points
ITAS	Performance Based Logistics: A Program Manager's Product Support Guide (2005)	Maximum flexibility
F/A-18	Lessons Learned (2004)	Lots of rice bowls and traditional authorities that have to be gotten past...fight off the bureaucracy that wants to dictate "how"
GE 404	Vitasek, Cothran and Rutner (2006a)	Afforded the flexibility to make and manage improvements in all aspects of F404 support from modifying repair processes to inserting lean manufacturing and supply chain practices, GE can achieve lots.
NAVY DEPOT (APU, Tires, etc.)	Bellis (2001)	Supplier acquires ownership, flexibility to improve supply chain.
C-130J	Blumberg (2007b)	Comntractor states: "Now, we have a flexible incentivized contract.
C-17	Barnes and Johnson (2010)	C-17 is currently maintained under a strategy of flexible sustainment. Success in emergencies such as experienced at Bagram Air Field in Afghanistan on Jan. 30, 2006 for a crash landed C-17.

The PBL programs, which include flexibility, have several successes, achievements. Performance requirements, goals to be achieved should be described in details, well; on the other hand how to achieve those should be left to the provider. Flexibility is one of the 15 attributes of a good PBL according to the study of University of Tennessee (Vitasek and Geary, 2008, p.64). Geary et al. (2010, p.462) count flexibility included long term relationships as one of the four fundamental elements of performance-based product support.

PBL environment gives providers flexibility in how to achieve goals. PBL agreement “gives contractors the flexibility to complete required tasks in the manner the firm deems most appropriate.” (Gansler, et al., 2011, p.57) Acquisition policies should include flexibility as stated in DoD policies. “DoD policies and procedures have consistently encouraged flexibility with respect to PSIs.” (Fowler, 2009, p.5)

## 7. Better Service, Best Value Creation, Best Practices

In thirty eighth out of eighty one documents, it is stated that PBL is for having better service, best value creation, and/or best practices. DoDD 5000.1 (2003, p.7) identifies PBL as a

sustainment strategy which shall use the best capabilities of public and private sector. DoD PBL Guide (2005), Bozkurt and Guducu (2005) cite this definition to emphasize gaining the best ability. “The transition to PBL as a product support strategy will evolve based on determination of the provider’s product support capability to meet set performance objectives.” (Performance Based Logistics: A Program Manager’s Product Support Guide, 2005, p. viii)

According to Doerr et al. (2005, p.165) the guiding principle for PBL is; if there is an outside vendor performing a better, more effective job than organic one, government should determine the desired outcomes and let the vendor does what he does better. Although PBL is not just outsourcing, the underlying idea is right; let PSI does the job to gain better service. The purpose is finding out the best decision, best value provider. “Best-value providers should be selected between government, industry and government-industry partnerships. These best-value providers would be the companies or entities whose support activities would yield, for the money spent, the maximum operational effectiveness of the system.” (Sols and Verma, 2007, p.40) One of the objectives that the sustainment program should accomplish is: “Select best-value, long-term product support providers and integrators based on competition.” (DoDD 5000.02, 2002, p.35; Kratz, 2001, p.14)

PBL does not favor either PSI candidates. “The decision is based upon a best value determination, evidenced through a PBL BCA, assessing the best mix of public and private capabilities, infrastructure, skills base, past performance, and proven capabilities to meet set performance objectives.” (Performance Based Logistics: A Program Manager’s Product Support Guide, 2005, p. 2-4)

“The determination of a PSI comes down to which entity has the best ability to drive life cycle systems engineering influence into the asset (to include reliability improvements), who can best direct supply chain management decisions to assure parts availability and



obsolescence management, and who can be incentivized to work as an agent for the program manager to meet the operational sustainment metrics” (Fowler, 2009, p.5)

According to Newsome (2008, p.3); PBL is changing the “approach to servicing their customers throughout all phases of a product life cycle: research and development; production and delivery; operation and sustainment; retirement and disposal”, to provide customers best value and maximize life-cycle performance. One of the main objectives of PBL is maximizing performance via letting the contractor delivering “the required service by following its best business practices, adjusting them accordingly” (Bozkurt and Guducu, 2005, p.19) PBL “partnerships allow each side to do what they do best.” (Goure, 2009, p.1)

DoD PBL Guide (2005, p. 3-6), Bozkurt and Guducu (2005, p.11) state that; when allocating workload, attention should be paid to let the one, who does that job better, do it. Evaluations of best capabilities should be considered at the beginning of the business. PBL strategy will vary along this work allocation done according to organic and commercial capabilities (Performance Based Logistics: A Program Manager’s Product Support Guide, 2005, p.2-3).

Sols and Verma (2007) think that buyer relies on the contractor’s knowledge and experience.

Gardner (2008, p.67) finds that, even in a sole source environment PBL achieved to be awarded due to the experience, knowledge, ability of the PSI (mostly OEMs). According to Berkowitz et al. (2003, p.8) OEMs are the best in managing technology and obsolescence. In addition to job skills and knowledge, management issues are on board. In PBL PSI is responsible for almost everything. According to Cothran (n.d.) PSI has a proactive role in this partnership.

“PSI must be an active entity – conducting detailed and comprehensive analysis, planning, and forecasting to ensure that the myriad decisions about the timing and

delivery of specific goods and services across the range of support providers will harmonize correctly to ensure success.” (Cothran, n.d., p.12)

Therefore PSI should “possess management/integration and program/project management skills and experience.” (Cothran, n.d., p.12) PSI is the single supplier (an umbrella) that provides all with best practices (Bellis, 2001, p.18). For a successful PBSA Gansler et al. (2011, p.61-62) recommend to “embrace commercial supply chain management best practices more fully. ... By adopting and tapping commercial supply chain management best practices, the entire DoD weapons system sustainment process could benefit.”

One of the PBL success boosters of Cebeci (2009, p.47) is working with experienced contractors. The experience, he mentioned, is not only PBL experience, but also work experience of provider and acquisition team.

“The Department of Defense shall maintain a fully proficient acquisition, technology, and logistics workforce that is flexible and highly skilled across a range of management, technical, and business disciplines. To ensure this, the USD(AT&L) shall establish education, training, and experience standards for each acquisition position based on the level of complexity of duties carried out in that position.” (DoDD 5000.01, 2003, p.8)

Customer satisfaction is one of the metric that can measure success. Cebeci (2009, p.50) finds out that; it is the most important factor among all. The rating of PSI’s customer satisfaction will improve the success. Cebeci (2009, p.48) identifies customer satisfaction as one of the goals of PBL.

“This method of contracting utilized for years in many aspects of production equipment, facilities, and business services, is becoming more prevalent in the Aerospace and Defense (A&D) Industry as the Department of Defense (DoD) and commercial airline industry try to decrease lifecycle costs while improving end-customer satisfaction.” (Newsome, 2008, p.2)

Cebeci (2009, p.16) cites Garrett (2005) and states that quality of the staff (for both partners) is a clear simple element of a successful PBL. Manpower and personnel requirements for both organic and commercial, is a key logistics criteria to be considered (DoD Designing and

Assessing Supportability Guide, 2003, p.25). Especially the key, critical personnel's continuity should be committed for success. Not only continuity but also ongoing education and training are obligations for effective, efficient performance (Sols and Verma, 2007, p.48). The support strategy should consider how to achieve most efficient and cost-effective mix of manpower from all partners (DoDD 5000.02, 2002, p.38). Trovato (2004, p.22) defines this partnership as two sides of the acquisition coin. This partnership shall provide best practices for all processes. In Baldwin et al.'s (2005, p.33) study, "Interviewees and ISM conference participants emphasized that an essential element of any purchasing organization's current and future success is the quality and expertise of its personnel." According to Gansler, et al. (2011, p.12-13) military is training young personnel, meanwhile commercial especially OEMs have the expertise. PBL gives the advantage of having experience at a given short time. Therefore it is easy to state that one of the potential benefits of PBL is having skilled workforce.

Vitasek et al. (2006a, p.8) suggest DoD to "press ahead with vigor, and work towards alleviating any remaining financial, statutory, or policy barriers that limit the full potential of PBL" and that will result utilizing best practices. Also, the report issued by PSAT recommends DoD to "connect platform product support strategies to enterprise supply chain approaches that produce best value across the DoD components." (Fowler, 2010, p.16-17)

Geary et al.'s (2010, p.475) case studies came up with several changes which are needed for an improved PBL, future acquisition strategies: "Integrating of government post-production support capabilities as best-value partners into a unified industrial base" and "creating the correct blend of government and industry partnership based on best value capabilities, not statutory entitlement" are two of them.

Twenty one documents explain this factor with examples. Table 9 shows the examples used by corresponding documents.

Table 9. Examples used in documents – Best practices.

Example	Reference	Key Points
Typhoon	BAE (2010)	Workforce: Our experienced teams work side by side with RAF personnel to deliver aircrew and groundcrew training, maintenance and servicing, technical support, and effective inventory and asset management.
JSF	Blumberg (2006b)	Experience: Eaton Aerospace approaches the risk with a base comfort because, in its commercial experience, Eaton's pumps and actuators demonstrate high reliability.
Tornado	Canaday (2006)	Ability: The DLO wanted to make sure BAE had the resources, skills, capabilities, facilities and ability to manage the project. BAE beefed up its resources in line with the planned strategy.
JSF	Canaday (2006)	Ability: The practical ability of Defense offices to switch support responsibilities on a major aircraft will require, first, adequate technical data, second, the right skills in government offices, and third, competent replacement firms.
Lockheed Martin partnered PBL programs	Cothran (2008)	Ability: To better posture themselves for this growing market, they have instituted a comprehensive Logistics work force development effort aimed at equipping their logistics personnel with the requisite skills, knowledge, and abilities to successfully accomplish this business strategy.
Defense Transportation Coordination Initiative (DTCI)	Dibenedetto (2007)	Best practice: Utilizing best commercial practices to enable load consolidation and optimization, use of more efficient intermodal means of transportation and tailored scheduling to meet the customer requirements.
Intercontinental Ballistic Missiles (ICBMs)	Goure (2011a)	Experience: The current integrating contractor, TRW/ Northrop Grumman, has some 60 years experience in designing, managing, building and supporting ICBMs. Having a single "button" to press simplified the management process, allowing the Air Force to shrink its workforce and probably reduced costs. This system has worked extremely well.
Intercontinental Ballistic Missiles (ICBMs)	Goure (2011b)	Experience: Were we dealing with fly-by-night companies, there might be a rationale for how the ALC's sometimes behave. But I am talking about Pratt & Whitney, Northrop Grumman and Boeing. These are world class companies with decades of experience in both commercial and military work, great supply chain management skills and unique engineering talent.
MCH-101	Harada (2010)	Experience: The proposed PBL contractor, Agusta Westland, produces the MCH-101 and has experience with the weapon system.
FLIR	Vitasek and Geary (2008)	Best practice: Each party was able to utilize their best practices to streamline the FLIR repair process.
GE 404	Vitasek, et al. (2006a)	Workforce: PBL partnership between the US Navy and General Electric, leveraging the Navy's workforce repair skills with the engine OEM's knowledge of the production process.
JSF	Vitasek, et al. (2006b)	Workforce: The contractor is able to contract back with the government for skilled labor at a low cost, in effect making the government both a customer and a supplier to the contractor.

As a result best value providers selected among industry and/or government is a key element of successful PBL environment (Kratz, 2001; Sols and Verma, 2007). PBL is the tool leveraging the capabilities of partners (Blumberg, 2006a, p.57; Blumberg, 2007a, p.42; Kratz and Buckingham, 2010b, p.299). "Under PBL, private sector contractors adapt their best commercial practices to large-scale program management, including risk mitigation and streamlining logistics chains." (Blumberg, 2006b, p.58) "Effective PBSA is considered a business best practice in the commercial world." (Gansler, et al., 2011, p.57)

## 8. PBL Experience, Awareness and Training

In thirty four out of eighty one documents, PBL experience, awareness and training are mentioned as a success factor for PBL. PBL is a new culture, even still for DoD. All DoD documents have a section regarding the implementation of PBL. For instance; DoD PBL Guide

(2005) introduces a method for implementing a PBL product support strategy. DoDD 5000.02 (2002) has a section about implementation of a Performance-Based Business Environment. Memorandum: Performance-Based Services Acquisition (2000, p.2) has an attachment “provides the necessary details regarding the PBSA implementation plan, training requirements, and other Department-wide PBSA initiatives.” In addition to DoD documents some of the authors include implementation processes in their studies. For instance Cebeci (2009) cites Performance-Based Management Process/Handbook Model (1997) and explains each step. Berkowitz et al. (2004) think PBL transition is a culture change. According to them organizational members’ behaviors should be changed. They also put a guideline for implementing PBL in their study. Nicosia and Moore (2006) lists the requirements for implementation of a new acquisition system. Vitasek and Geary (2007, p.9) explains “a twelve-step process that it recommends for implementing PBL and a seven-step process for implementing Performance-Based Services Acquisition.”

This culture change is a challenge for all partners. “Most of the personnel and organizations have years of experience developing requirements-driven, specification-constrained, custom-designed and built, components and systems. For many of the DoD’s logistics and acquisitions employees, implementing PPPs changes the nature of their work.” (Gansler et al., 2011, p.55)

One way to ease the implementation of PBL is experience. Geary (2006) states that experience will make DoD to do better jobs. “Maximizing PBL benefits will continue to drive us to develop a more complete understanding of the risks and uncertainties that must be addressed, in order to expand adoption and meet the requirements.” (Geary, 2006, p.78) The more experience gained the better jobs will be done in the future. Companies who have experience or emerging best practices for procuring services through a performance-based approach are the

ones to be studied by researchers regarding the best PBL (Venema, 2007, p.1). Even mistakes will make you gain experience. Cothran says that “Companies that want to explore a PBL business model can learn much from the mistakes of the DoD” (Vitasek and Geary, 2007, p.8)

Harada (2010, p.27) suggests the government to look how commercial firms have successfully implemented performance-based services acquisition to have a better understanding. Berkowitz et al. (2004, p.265) recommends “an educational program to clarify the understanding and comprehension of the definition, scope, and purpose of PBL.”

Acquisition personnel are so important in this factor. As mentioned before Cebeci (2009) acknowledges that “the quality of an acquisition team is important.” He emphasizes that not only ‘experience in job’ is enough but also ‘experience in PBL’ is required. According to Kratz and Buckingham (2010a, p.60) “performance based arrangements are complex and require a knowledgeable DoD life cycle workforce that has core competencies in all product support functions and full insight/oversight of contract and agreement execution.”

As stated before, PBL may still be counted as a new strategy. Training is the only way to be aware, sophisticated. Training is counted as one of the key support areas in DoD PBL Guide (2005).

“A report of the Acquisition Advisory Panel sums it up best: ‘When individuals without the proper training and experience attempt to implement a performance-based contract, the results are understandably and expectedly poor...there is trouble consistently implementing it by an inconsistently trained workforce.’” (Kobren, 2009, p.265; Vitasek and Geary, 2008, p.64)

“Training is essential to increasing performance-based acquisition for services” (Memorandum: Performance-Based Services Acquisition, 2000, p.1; Pettingill et al., 2004, p.2) and DoD is “committed to providing to the acquisition workforce the training and tools needed to define, acquire, and manage service requirements efficiently and effectively.” (Memorandum:

Performance-Based Services Acquisition, 2000, p.1) According to Kobren (2010) training is one of the critical requirements for PBL. Also Geary et al. (2010) determines training and education as the fundamental action for PBL implementation.

There are several certificate courses present for DoD. According to Gansler et al. (2011, p.56); although there is still much to do, “DoD has made considerable progress on designing and implementing appropriate educational and training programs.” Brown and Cothran (2005) lists these educational options; PBL Training Courses, PBL Continuous Learning Module, PBL Online Knowledge Sharing, PBL Researches by Defense Acquisition University (DAU). DAU knows what is needed:

“PBL contracting has demonstrated we can apply the concept of performance-based outcomes to a particular sector of DOD support. We need to inculcate the DOD culture, using lessons learned from PBL, moving toward performance-driven outcomes in all areas. We need to build on lessons learned from continuous process improvements, and apply an overall performance-based outcomes approach, tying all budgeting and contracting to a warfighter-supported metric.” (Blumberg, 2007a, p.42)

Kobren (2010, p.199) finds these courses useful for “more rigorous, competency-based defense acquisition workforce.”

Blumberg (2006a, p.60) showed the gap in educating the contractor side and recommended education, especially “executive education to get the top people on board with the concept” due to this culture change. According to Vitasek and Geary (2007) one half of education is education of DoD personnel, the other is contractors. Tennessee’s Center for Executive Education has PBL courses for service providers. Industry leaders such as Lockheed Martin, Raytheon, Pratt Whitney, Northrop Grumman and Boeing sponsored and signed up for these courses. Wuchenich (2008) explains the courses in his study and states that one of the four popular research subjects of University of Tennessee is PBL training programs. As a result “there are two main resources—the Defense Acquisition University and the University of

Tennessee.” (Vitasek and Geary, 2008, p.64) In addition to that they teamed up for a collaborative education workshop. “The DoD's Defense Acquisition University group teamed with the University of Tennessee to run joint workshops for DoD program managers and their contractors.” (Maylett and Vitasek, 2008, p.5) These are the things done for education and training for PBL.

Devries (2004) identifies lack of PBL awareness and training as one of the barriers for PBL implementation. Half of the survey participant programs (26 programs) identified lack of PBL training as a barrier. According to his research results; it is one of the most frequently encountered barriers.

DoD wants Program Support Managers (PSMs) to have “At least 8 years’ acquisition experience, which includes at least 6 years in LCL, with at least 2 years in a program office or similar organization.” (Kobren, 2010, p.197) DoD emphasizes on experience especially for life cycle support programs such as PBL. Kobren (2010, p.199) recommends DoD to develop “highly capable, highly effective PSMs with a truly strategic, enterprise-level perspective.” Employees dealing with PBL should “have the appropriate training and tools needed to do their jobs.” (Gansler et al., 2011, p.59)

Blumberg (2007a) states that top level management’s commitment from both sides is required for PBL implementation. Top-level support from both parties is one of the success keys of PBL according to Kate Vitasek (Blumberg, 2007b, p.5).

“Vitasek says you need champions on both the contractor and the DOD side for the business model to shift to a performance-based model. ... They both have to be equally dedicated to dynamic performance approaches, not just taking an existing program and slapping on metrics and a bonus structure” (Blumberg, 2007a, p.44)

“Attaining the full benefits of public-private partnerships can only be accomplished by continuing to work to change the culture within DoD—and in Congress—to view PPPs as collaborations that can bring the best of the public and private sector knowledge and



resources to bear on the issue of sustaining weapons systems. This is an education process that must address several perspectives.” (Gansler et al., 2011, p.64)

Nine documents give examples of experience and training for PBL implementation and culture change. Table 10 shows the examples used by corresponding documents.

Table 10. Examples used in documents– PBL Implementation, Experience.

Example	Reference	Key Points
NAVICP (A/C Tires and APU)	Berkowitz et al. (2003)	Top Management Commitment: Commanders pushed the PBL concept through the organization. Early on, the leadership recognized and verbalized the benefits of PBL. Culture Change: Culture champions exist throughout DLA to devise transformation activities to close gaps in the culture between today's baseline and its goal of becoming a truly customer-focused organization.
F-22 Raptor	Blumberg (2006b)	Training: A lot of internal company PBL training is done. It was born out of the commercial work. It's been taken a one-company approach across divisions, sharing best practices between commercial and military operations.
U.K. PBL Programs	Canaday (2006)	Experience: BAE Sunit has been working for the U.K. on a series of pilot programs for five years. In December 2005, the Ministry of Defense announced a Defense Industrial Strategy that aims for through-life capability on all new aircraft acquisitions. The pilot programs achieved impressive results and built valuable experience.
Lockheed Martin partnered PBL programs	Cothran (2008)	Experience, Implementation: The Global Hawk program office is aggressively pursuing PBL initiatives. Thus far, they have consulted with JSTARS representatives and have developed an implementation schedule for PBL arrangement by 2007. It is identified the comprehensiveness of the Global Hawk's implementation schedule as a best practice. The schedule is particularly noteworthy because it presents objectives for the integration of PBL throughout an 8-year period (FY04 – FY11).
Navy PBL Programs	Goure (2010)	Top Management Commitment: One of the several reasons why the Navy has had such success is; its willingness to bring all the stakeholders to the table and to manage the effort holistically.
HIMARS	Lessons Learned (2004)	Experience and Training: The lesson learned is that experience and/or training on PBL contracting across all levels (including the Army Staff) is vital to the successful award and implementation of PBL contracts.
H-60 FLIR	Lessons Learned (2004)	Experience: Each platform has unique challenges and limitations so comparisons of one program's PBL to another may be misleading. Additionally, each contractor is different and has its own level of experience and confidence in the PBL process.
F-22 Raptor	Marietta (2008)	Implementation: The 2008 PBL System Level Award went to the F-22 team. The PBL awards program recognizes government and industry teams that demonstrate outstanding achievements in PBL development, implementation and execution. This is the third time that a Lockheed Martin program or company has won the annual award.
Global Hawk	Pettingill et al (2004)	Ability: The practical ability of Defense offices to switch support responsibilities on a major aircraft will require, first, adequate technical data, second, the right skills in government offices, and third, competent replacement firms.

As a result PBL is a culture change not only in DoD but also in private sector (Gansler, et al., 2011). “Success requires a clear understanding of the organizational changes required, inclusion of partner.” (Burkett, 2008, p.5) Experience, awareness, knowledge of PBL is a success key for implementation. Vitasek and Geary (2008, p.64) identifies one of the fifteen attributes of a good PBL is: “Comprehensive knowledge and experience in PBL concepts, tenets, business model, and implementation of PBL strategies.”

## 9. Innovation

In twenty eight out of eighty one documents, it is stated that innovation is an obligation for PBL. DoDD 5000.01 (2003) mandates using PBL strategies whenever feasible; not only to increase competition, and interoperability but also innovation. As stated before providers are not to be told how to do, they are allowed to use innovative approaches. These statements are cited

from Memorandum: Performance-Based Services Acquisition (2000) and also used in DoD PBL Guide (2005). Some authors such as Kratz (2001), Bozkurt and Guducu (2005), Cebeci (2009) cites DoD's statements in their study, to emphasize innovation. Boehk (2003, p.1) identifies DoD's PBL strategy; "an innovative new program."

Performance Based Logistics: A Program Manager's Product Support Guide (2005) explains product support boundaries (PSB) and even these boundaries include innovation.

"PSB provides the strategic construct for innovation within a consistent support structure for the warfighter. ... The aim of the PSB is to provide the boundary conditions for product support strategies that allow innovation but ensure consistency and interoperability across programs." (Performance Based Logistics: A Program Manager's Product Support Guide (2005, p.1-3)

DoD Acquisition System shall govern innovation as one of the policies:

"Throughout the Department of Defense, acquisition professionals shall continuously develop and implement initiatives to streamline and improve the Defense Acquisition System. MDAs and PMs shall examine and, as appropriate, adopt innovative practices (including best commercial practices and electronic business solutions) that reduce cycle time and cost, and encourage teamwork." (DoDD 5000.01, 2003, p.3)

Memorandum: Performance-Based Services Acquisition (2000, p.1) states that PBSAs allow "offerors maximum flexibility to attain the greatest degree of innovation and creativity." "There is more room for innovation and creativity." (Sols and Verma, 2007, p.40) Buyer is relying on contractor's knowledge, experience and skills. "The contractors are given the necessary freedom and responsibility to innovate and apply their domain knowledge and experience, within a context of financial motivation and incentives." (Sols and Verma, 2007, p.49) According to DoD Designing and Assessing Supportability Guide (2003, p.7) providers are allowed "to offer innovative, cost-effective solutions."

GAO report (2008b, p.8) states that one of the intents of PBL's benefits is "encouraging contractors to be innovative and to find cost-effective ways of delivering services for a fixed

level of funding.” To gain that benefit focus should be shifted from process to results.

Buyukgural (2009, p.14) cites Rievley (2001) regarding telling contractors how to do; “limiting them by mandating how to produce their product or service under non-PBL contracts may result in losing an opportunity of benefitting from their innovative approaches and cumulated experience.” According to him PBL will keep its promises of sustaining desired outcomes with lower costs by innovation. “Performance-based acquisition creates a new acquisition environment for both industry and government by promoting flexibility and innovation and by creating win-win solutions through effective communication.” (Cebeci, 2009, p.54)

“There are savings to be had, as well as enhanced performance. Particularly important is the ability of innovative partnering solutions to reduce the amount of work in progress, lower the burden of oversized inventories and slow supply chains, and increase the availability of repaired, refurbished and reset weapons systems.” (Goure, 2010, p.2)

Innovation is one the keys for the promises of PBL. PBL’s goal is having improved performance while decreasing costs.

“American industry provides a source of innovation, and flexible and productive capacity for the defense industrial base. The way ahead for more cost-effective product support lies in effective blending of these complementary capability sets where the best use is made of the entire industrial base, facilitated by the continuing expansion of best business practices in both the commercial and government sectors.” (Geary et. al, 2010, p.454)

Goure (2009) sees PBL as an innovative reform. Berkowitz et al. (2004) state that; development and implementation of PBL include some form of creativity, innovation. Aviation Week Executive Roundtable participants agree; in PBL environment much innovation and creativity takes place (Hedden, 2005, p.3). PSI should have creative approach to find great ways to improve processes. Innovative approaches are required for a better PBL (Vitasek, 2007). According to Kratz and Buckingham (2010a, p.59); “industry invests in development costs with an equal emphasis on maturation and innovation.” Future acquisition strategies will include innovation (Kratz and Buckingham, 2010a, p.58; 2010b, p.293).

Indeed, DoD needs “innovative ways to contain costs while improving the performance of its maintenance and logistics system.” (Goure, 2010, p.1) DoDD 5000.02 (2002, p.31) counts “the use of pilot programs to explore innovative practices” in best practices. Berkowitz et al.’s (2003, p.13) study shows that “in 1998 DoD established thirty sustainment pilot programs, of which twenty-four adopted innovative product support strategies.” According to them, new acquisition systems should be exceptional; include and encourage innovation applying ingenuity. The underlying idea under PBL is: “to allow contractor to apply ingenuity and innovation to efficiently deliver the requirement instead of dictating the Government preferred approach.” (Berkowitz et al., 2003, p.49)

Geary et al. (2010, p.475) list “creating a culture of high-performing, innovation-driven government- industry teams” in required changes and their study concluded that depending on the case analysis.

Kelman (2007) emphasizes the importance of innovation via complaining about inspector generals. According to him they are not focusing on creativity, innovation. Their only purpose is controlling, not developing creative, innovative solutions to problems.

The House Armed Services Committee (HASC) Panel on Defense Acquisition Reform in March 2009 recommends “improving competition and access to more innovative technology by utilizing more of the industrial base, especially small and mid-tier businesses.” (Kratz and Buckingham, 2010b, p.302)

Eight documents supported innovation, as a factor of PBL’s success, with examples. Table 11 shows the examples used by corresponding documents. All examples are candidates of best PBL and all include innovation somewhere and somehow. As a result innovation is a key for a successful PBL.

Table 11. Examples used in documents– Innovation.

Example	Reference	Key Points
U.K. PBL Programs	BAE (2010)	BAE partners with the UK Royal Navy to deliver 24/7 dedicated support to a number of the UK's warships, working to ensure they are available whenever and wherever they are needed. This innovative approach to support the UK's River Class, Survey Vessels and HMS Clyde has delivered unprecedented vessel availability. BAE believes that the have skills, creativity, innovation, experience and know how to proactively find bold and efficient ways to deliver value for our customers.
C-17	Barnes and Johnson (2010)	The group's mission is to provide executive oversight related to key strategic issues impacting the C-17 depot sustainment activities and product support. The gatekeepers help determine the best integrated life cycle management strategy according to statutory and regulatory guidance. In addition, they provide strategic direction to establish effective, affordable, and innovative strategies focused on C-17 sustainment.
NAVICP Programs (A/C Tires, APU)	Bellis (2001)	These innovative government/industry partnerships has revolutionized how NAVICP provides logistics support to its fleet customers.
APU - Honeywell	Gansler et al. (2011)	Better forecasting and the other innovations results lots of cost savings.
Huntsville (ITAS, HIMARS, Shadow 2000, TAIS)	Geary et. al (2010)	Team climate for innovation and team innovation are two of the eight critical PBL-driven interorganizational success factors. They have a culture of demonstrating innovation and leadership when it comes to post-production support. They created an innovative environment where the adoption and application of best commercial business practices have been embraced.
C-130 J	Geary et. al (2010)	The stratgy implemented for a/c is innovative and successful. This innovation sets a benchmark for partnering with industry and leverages that relationship to increase weapons system availability while reducing operating costs.
C-130 Avionics Modernization	Kratz (2001)	Based on the lessons learned from the pilot programs, new weapon systems and major upgrade programs are implementing a variety of innovative PBL strategies that capitalize on effective government/industry partnerships.
Army Sentinel	Kratz (2001)	The system will employ an innovative PBL strategy. Approach features life cycle system support through PSI including integrated logistics, total asset visibility, depot partnering and unified configuration management.
F-22 Raptor	Marietta (2008)	F-22 Raptor as an exemplary program in Performance Based Logistics (PBL), an innovative support approach that provides higher aircraft readiness to warfighters and lower overall costs to taxpayers.
F-117	Marietta (2008)	Lockheed Martin won the System Level Award as part of the Air Force F-117 Nighthawk total system support partnership team, for innovative contracting measures enhancing war fighter capabilities and cutting costs.
JSTARS	Slinkard and Poleskey (2006)	Contracting approach allowed both government and contractor to appropriately share the risk associated with the firm pricing out year requirements within the potential award term period. Similar innovative approaches can also be applied to the competitive environment.

## 10. Data Requirement

In twenty seven out of eighty one documents, it is stated that data is a requirement for PBL. There are three kinds of data needed; historical data for baseline, cost data for estimations and present data for evaluations.

PBL is invented especially for providing improved performance. According to DoD PBL Guide (2005) performance baselines may be calculated from past experience. It is “very hard to guarantee product availability due to significant uncertainties in product reliability and usage as well as inherent product complexity, resulting in large risks to both the customer and service provider.” (Cohen and Netessine, 2007, p.2) Performance Based Logistics: A Program Manager's Product Support Guide (2005, p.3-28) forces BCA to include data required to support and justify the PBL strategy, and data sensitivity.

According to Gardner (2008, p.48-50) lack of the historical data is one of the factor influences PBL strategy. “Both the government and commercial vendors must consider various risks such as ... accuracy of future demand based on historical data.”

Also for accurate evaluation; a baseline is needed. “System performance is to be evaluated against a performance baseline based on historical data. ... Historical performance data are essential in setting sound objectives in PBL contracts.” (Sols and Verma, 2007, p.47) Aviation Week Executive Roundtable participants define “the appropriate level of system/subsystem/item to be included in a performance-based contract” as a challenge according to data requirements (Hedden, 2005, p.3). Historical data is also a requirement for processes of support. “The collection, analysis, and evaluation of system performance and maintenance performance data to determine the need for and prescribe changes to the system configuration, maintenance support structure, and maintenance resource requirements” is a key logistics criteria according to DoD Designing and Assessing Supportability Guide (2003, p.25).

Buyer must have the ability to reach the data at any given time. In case of applying a system level PBL, “customer often lacks maintenance and logistics data to analyze PBL. ... It is not unreasonable to assume that suppliers would charge significant sums of money to provide such data if they enjoyed a monopoly on such information.” (Harada, 2010, p.23)

“Data Management (DM) is an important part of Total Life Cycle Systems Management (TLCSM), and PBL and should be considered early in the acquisition life cycle. Data systems supporting acquisition and sustainment should be connected, real-time or near real-time, to allow logisticians to address the overall effectiveness of the logistics process in contributing to weapons system availability and Life Cycle Cost (LCC) factors.” (Performance Based Logistics: A Program Manager’s Product Support Guide, 2005, p.4-28)

Maj. Gen. Daniel Mongeon thinks logistics data as DNA building blocks for acquisition. According to him data integration, interoperability and integrity are all key factors of success

(Anonymous, 2005, p.33). “Continuous and accurate information enables the PBL contractor to anticipate demand, identify and implement desirable change in design, fabrication or transportation of items, and even alternative maintenance practices.” (Gansler et al., 2011, p.14) Nicosia and Moore (2006) thinks improving data availability, quality, and utilization are important for both government and industry. It is used not only for performance evaluation but also for supplier selection.

Baldwin et al. (2005, p. xiii) recommends DoD (especially Air Force) “to implement new data collection procedures for many of the required data, particularly supplier and customer satisfaction data.” Kratz and Buckingham (2010a, p.61) states that “Government should procure access and rights to system technical data to enable long-term sustainment and competition” regarding DoD’s PBL efforts. PSAT reports suggests so: “Develop an overarching DoD sustainment metrics and management strategy for life cycle product support that strengthens formal data collection and analysis capabilities while providing insight and learning to support life cycle planning and operational management.” (Fowler, 2010, p.17; Kratz and Buckingham, 2010b, p.298)

Blumberg (2006b; 2007a) states that at least two years’ data (such as production data and reliability data) is needed to apply PBL to a legacy program.

“A large defense prime contractor summed it up well: PBL contracts demand more data to be successful. It’s necessary to mine that data deeper, get cost roll-ups on total systems versus components, identify redundancy, analyze mean-time-between-failure reliability data, and optimize spares and service technician placement.” (Burkett, 2008, p.5)

As a result regarding historical and current data; “A successful performance-based agreement (PBA) generally requires a continuous flow of high-quality information about the status and history of every element of the supply chain and about the parts, systems, or even platforms subject to the contract.” (Gansler et al., 2011, p.14)

Not only performance data but also cost data is required. “The cost and performance baselines for legacy systems will be determined by historic experience and costs. The cost baseline will include all appropriate Government and/or contractor costs, including indirect costs, overhead, and handling fees.” (Performance Based Logistics: A Program Manager’s Product Support Guide, 2005, p.3-29) DoDD 5000.02 (2002, p.31) lists “realistic cost estimates and cost objectives” under best practices. Obviously data is required for that.

It is really hard to determine a cost for a service when there is not any market for that.

Doerr et al. (2005, p.165) describe this with a generic example:

“... when discussing the transportation of freight within the U.S., prices are perhaps not difficult to determine by reference to a market for commercial transportation services. However, when discussing a service such as intermediate-level maintenance of a deployed weapon system such as an aircraft, on which the DoD has a monopsony and the number of qualified bidders is quite limited (and may indeed be only one or two), the market paradigm clearly breaks down, and market prices are not available.”

Especially for new systems, DoD chooses Cost Plus contracting approaches at the beginning. “As a general rule, Fixed Price contracts should be avoided, until the price can be predicted at a certain level of confidence.” (Bozkurt and Guducu, 2005, p.14) We do not know the cost at all at early phases. Although it is not hard for legacy systems due to having lots of data, sometimes it may be a problem, too.

“Even assessing what it really costs the government to perform logistical support for a weapon system is often a hugely daunting task. It typically requires analysis of years of data, and to be realistic, must analyze a myriad of costs that are hidden throughout an enormous bureaucratic system.” (Gardner, 2008, p.21)

GAO Report (2008b) emphasizes on cost data requirement especially in business case analysis. One of the recommendations to DoD in GAO Report (2008b, p.6) is:

“Require the development of business case analyses, specifying the elements to be included in them so that they are comprehensive and sound and that the services improve their internal controls to ensure that the analyses are performed, and that program offices collect and report detailed support cost data for their PBL arrangements.”



Gardner’s (2008, p.50) study finds out that; “various risks such as changes in costs and operational environments, unknown costs associated with infant programs, and accuracy of future demand based on historical data” should be considered by both partners of PBL.

Seven documents give examples about data requirement. Table 12 shows the examples used by corresponding documents.

According to Newsome (2008, p.4); “the ability to price the contract correctly (prior to execution)”, “determining an accurate forecast of customer requirements” and “understanding and gaining access to customer requirements” are three of the five biggest challenges. These are all related to data requirement.

Table 12. Examples used in documents– Data Requirement.

Example	Reference	Key Points
Army Aviation Missile Command PBL Programs	Berkowitz et al. (2003)	Cost Data Requirement: The study identified six major gaps between AMCOM's business operation and the best practices from Defense and industry. One of the need is understanding cost fully.
U.S. Army/AAI Unmanned A/Cs	Blumberg (2007a)	The University of Tennessee case study points out that Phase I of the U.S. Army/AAI contracting relationship (2003-2006) allowed time "to validate and verify the metrics and data collection processes.
JSF	Canaday (2006)	According to him regarding the success of this program; full PBL needs four kinds of information: 1) business processes for handling needed parts and repairs 2) information on fleet performance; 3) data on parts, their configuration and location, and 4) performance data and interpretation to flag the need for parts or repairs in a timely fashion.
C-17	Hedden (2007)	The C-17 support team, for instance, has the data and experience needed to plan and anticipate the aircraft's needs in a high tempo operation environment. Experience, then, becomes an asset. Integrated Defense Systems, the focus is translating the KPPs into metrics that companies can fully define based on data generated during real-time use, and then pushing those metrics throughout the supply chain.
Navy Aircrew Survival Equipmentman	Lessons Learned (2004)	It is recommend starting with a cost contract initially to establish historical basis/trend data for growing into a realistic fixed-price environment.
Global Hawk	Pettingill et al (2004)	Authors identified the comprehensiveness of the Global Hawk's implementation schedule as a best practice. PM started considering PBL as a support strategy early in FY04 by defining the metrics, costs, and the systems used to collect this data.
Norwegian Intercity Rail (Industry example)	Sols and Verma (2007)	Performance and Cost Data Requirement: The authors emphasize the need for the model to establish a reference point or year and to calibrate a cost function and a demand function during this reference year. A historical performance basis is essential to setting a sound PBL contract.

Consequently it can be easily stated that without sufficient data, information a PBL does not work well, whether the system is new or legacy. Therefore data is required for a successful PBL.

“It’s difficult to do a true PBL contract if you don’t have good data, because early in the lifecycle, you can’t project repair costs out 10 years. You just don’t have the history of how the system performs in the field over time and usage. ... As a weapon system matures and becomes a legacy system, you then look at pulling some of the major systems or subsystems off and giving them to the OEM to manage. You would now have plenty of performance history data with which to forecast demand and manage repair cycles.” (Gansler et al., 2011, p.27-28)

## **11. Competition and PSI Candidates**

In twenty two out of eighty one documents competition and PSI candidates are stated important for PBL. Performance Based Logistics: A Program Manager's Product Support Guide (2005) identifies the purposes of using performance based strategies; one of them is maximizing competition. It is stated so, in Memorandum: Performance-Based Services Acquisition (2000) and DoDD 5000.01 (2003). Not only DoD documents but also FAR mandates competition. "In order to maintain a competitive environment, industry participation will be determined in accordance with the FAR." (Performance Based Logistics: A Program Manager's Product Support Guide, 2005, p.3-30) Competition is one of the acquisition policies of DoD. DoDD 5000.01 (2003, p.5) explains the policy in details:

"Competition shall provide major incentives to industry and Government organizations to innovate, reduce cost, and increase quality. All of the DoD Components shall acquire systems, subsystems, equipment, supplies, and services in accordance with the statutory requirements for competition. Acquisition managers shall take all necessary actions to promote a competitive environment, including the consideration of alternative systems to meet stated mission needs; structuring Science and Technology (S&T) investments and acquisition strategies to ensure the availability of competitive suppliers throughout a program's life, and for future programs; ensuring that prime contractors foster effective competition for major and critical products and technologies; and ensuring that qualified international sources are permitted to compete. If competition is not available, PMs shall consider alternatives that will yield the benefits of competition."

DoDD 5000.02 (2002, p.31) lists "adequate competition among viable offerors" under 'best practices' title. According to that directive competition is the elements that support strategy should include. It is the most powerful incentive in the industry.

One of the most important things for competition is willingness. Buyer should find contractors who are willing to accept the PBL strategy. "There must be a vendor who is willing to contract with the customer." (Harada, 2010, p.26) In case of not having a willing candidate, how PBL works. According to Doerr et al. (2005, p.169) "the best PBL candidates are those with

external markets for services.” Service should have a market at least for parts. “Granted, not every supplier has been thrilled” by PBL (Cohen and Netessine, 2007, p.3). Their study show that 5 of the 128 suppliers, who are solicited by DoD at a recent PBL support contract, responded. But suppliers are getting used of PBL and getting more interested day by day.

Competition is fundamental for every acquisition. PBL is using performance requirements to “increase the opportunity to maximize competition on supplier base.” (Bozkurt and Guducu, 2005, p.19) According to Bozkurt and Guducu; it is one of the main objectives of PBL.

“The most likely candidates for the integrator role are:

- The system’s original equipment manufacturer or prime contractor;
- An organic agency, product, or logistics command (e.g., DLA, Naval Inventory Control Point (NAVICP), depots);
- A third-party logistics integrator from the private sector;
- The PM’s own logistics organization.” (Performance Based Logistics: A Program Manager’s Product Support Guide, 2005, p.3-12; Pettingill et al, 2004, p.9; Gansler et al., 2011, p.7-8)

Cothran (n.d., p.9-10) makes a similar list for candidates and explains them in details:

“• Prime Vendor/Original Equipment Manufacturer (OEM). ... The Prime Vendor/OEM, with responsibility for designing, producing, and successfully fielding a subject system has a vast array of system knowledge and corresponding robust infrastructure (equipment and facilities), along with in-place sub-contractor support, trained personnel, technical data, proprietary rights, and numerous other irreplaceable qualities and skills that make them eminently qualified to assume the PSI role.

• Third Party Logistics (3PL) Provider. The use of 3PLs is becoming more prominent in both the public and private sectors. 3PLs are attractive PSI candidates when they meet... significant expertise in a Logistics functional area encompassed by the PBL relationship ... significant experience in integration management, especially when there is no clear ‘Prime’ vendor/OEM.

• Organic DoD Organization. For legacy systems ... where PBLs will most often be initiated at ‘less than system’ level, the overall PSI top-level integration function will usually be done organically, either directly through the Program Office, or in partnership with a key organic support organization, such as a Depot or Inventory Control Point.

• Program Management Office. As reflected under ‘Scope’, above, the Product Support Integration function may be accomplished within the PMO when a horizontal PBL strategy composed of both PBL and non-PBL discrete a functional support strategy has been implemented.”

Trovato (2004) lists them, too and states that those are all organized to provide what is promised by PBL via competition; higher performance, lower costs. Gansler et al. (2011, p.59) states so: “The key is leveraging competitive pressure to obtain better performance at a lower cost.”

Due to their knowledge, familiarity, experiences regarding the system, OEMs have an advantage as mentioned before. They have advantage in sole source environments, too.

“... most PBLs have been awarded in what is effectively a “sole source environment,” expressing that in reality, no firm other than the prime contractor or OEM has the knowledge and ability to provide PBL support for a weapon system, so “OSD’s notions of competition are really not operable.” (Gardner, 2008, p.66-67)

In most cases government should rely on OEMs, because of not having another candidate or organic support. Gardner (2008) lists this phenomenon in his ‘issues, influencing the contracts’ table. Berkowitz et al. (2003, p.50) agree that; “OEM has an advantage early in the development/fielding cycle of the system” and “technology insertion/obsolescence is best managed by the OEM.” Although they have some advantages, DoD does not favor any candidate. DoD favors knowledge. The contractor “having the most intimate knowledge of manufacturing processes, system reliability, and potential improvements, may be a prime candidate for entering into a public/private teaming relationship.” (Performance Based Logistics: A Program Manager’s Product Support Guide, 2005, p.3-12)

“While a majority of successful PBL Product Support Integrators (PSI) are in fact industry partners (and in many cases, the OEM), contrary to popular misconception, there is no mandate in DoD policy to use a commercial sector PSI, or even use an industry product support provider.” (Kobren, 2009, p.260)

DoD should “select best-value, long-term product support providers and integrators based on competition.” DoD’s “source of support decisions shall foster competition throughout the life of the system.” (DoDD 5000.02, 2002, p.35-36; Kratz, 2001, p.14) According to Kobren (2009)

DoD does not change the selection, reliance on suppliers; the only change is how they do business, processes.

PBL is good to be used where the candidates are hard to manage. Harada (2010) agrees and explains it with Navy example. 'Fewer suppliers' is easier. Nicosia and Moore (2006) believe that with few, transactions go down, manageability increases; but on the other hand 'few by means lean' has risks. Buyer should pay attention. Baldwin et al. (2005, p.13) agree that:

“... determining the ‘right’ number of suppliers for the company could mean trying to decrease or increase the number of suppliers providing a given good or service. A company with too many suppliers might not have sufficient leverage over any individual supplier to reduce costs or increase performance. On the other hand, a company with too few suppliers could be at risk if suppliers do not feel competitive pressure to innovate and improve or if suppliers have difficulty fulfilling their commitments.”

One of the top ten challenges is management of suppliers as Newsome (2008, p.5) stated.

“A support environment that maintains long-term competitive pressure” is a key element of PBL (Kratz, 2001, p.12). According to Kratz (2001) pilot programs thought that buyers must take necessary actions to sustain long term competition.

Kratz's and Buckingham's (2010a; 2010b) list of future acquisition strategies have industry competition as a property in common. Therefore it is a basis to be paid attention for acquisition strategies. Although U.S. Government believes that PBL is decreasing competition according to the long term contracts; Goure (2010) emphasized the importance of industry competition in acquisition and argues U.S. Government statements regarding the declared reason for going back from PBL is to have more competition.

HASC Panel on Acquisition Reform recommends DoD to improve competition all-business-wide and throughout the life cycle of a system (Kratz and Buckingham, 2010b, p.301). DoD's life cycle management suggests and mandates to do so for all stages of PBL.

Four documents used examples to express their support to the ideas above. Table 13 shows the examples used by corresponding documents.

As a result; from traditional approaches to future strategies including PBL, competition is a requirement for procuring what is needed.

Table 13. Examples used in documents– Competition.

Example	Reference	Key Points
U.S. Air Force PBL Programs	Berkowitz et al. (2003)	OEM's advantage: The Total System Support Responsibility (TSSR) is the Air Force's approach to PBL. Since the AF weapon systems (aircraft) are heavily dependant on the OEM, it is a natural progression to continue to do business with the OEM after the system is deployed. The use of the OEM is one way to be sure that the expertise exists.
B-1B Lancer	Berkowitz et al. (2003)	Few Suppliers: According to authors; one of the lessons learned from their contract experience is keeping the number of vendors small.
Turkey Navy: Transportation	Bozkurt and Guducu (2005)	Due to having few supplier candidates, authours suggest to use PBL as an acquisition strategy.
A/C Tires: Michelin	Dean (2002)	PSI: Michelin is the PSI of this program. Michelin just supplies the items. Other vendors handle all other process such as stock control, all transactions, demand forecast, etc.
Japan Maritime Self-Defense Force: MCH-101	Harada (2010)	Managing Few Suppliers: The PBL contract stakeholders are limited, because there are just two main suppliers, so it is easier for JMSDF to structure its organization around the PBL contract.
U.S. Navy PBL Programs	Harada (2010)	Willing: The U.S. Navy prefers to use PBL for expensive or delicate items, those for which readiness is a critical issue, and hard to manage candidates. It also says that "there must be a vendor who is willing to contract with the customer" and "the vendor must be affordable to the customer"

## 12. Properties of System

In seventeen out of eighty one documents, it is stated that properties of system should affect PBL. All literature agrees that every acquisition does not fit in PBL. For instance PBL is mostly good for new, strategically important, high-tech, complex, long life, capital intensive systems. On the other hand PBL is not good at all for legacy systems at their end of lives, highly reliable systems, etc.

Strategic importance, criticality of system is the most attractive point for owners. As Goure (2011b, p.2) asks; "... what is more important, national security or more work for the ALC?" And regarding the cost; which is important reduction in costs or providing national security? President Obama stated: "Our defense budget isn't about politics, it's about the security of our country, and who knows that every dollar wasted is a dollar we can't spend to care for our troops or protect the homeland." Therefore one of the most important points is to be ready when a critical system is required.

According to Harada (2010, p.26) “U.S. Navy prefers to use PBL for expensive or delicate items, those for which readiness is a critical issue”, and for “U.S. Air Force, newer aircraft tend to use PBL more than older aircraft.” After stating not all fits in PBL, Harada (2010, p.47) lists which are suitable which are not: “... high-technology weapon systems or components are good candidates for PBL, but low-production special weapon systems or highly reliable weapon systems are not suitable for PBL.” Buyukgural (2009, p.14) agrees Harada (2010) regarding high technologies. According to him, “if the contractors could produce a highly technological product or service, then they should know how to improve it by means of reliability and cost aspects.”

In addition to high-tech-systems; Sols and Verma (2007) list “large scale, long-life, and capital intensive systems” to be fit in PBL. They emphasize the intent of PBL; improving performance while reducing logistics footprints. They recommend shifting to PBL from traditional approach when sufficient life time has been left for the system. Sols and Verma (2007) reports this shift trend in their study. Kim et al. (2006) pointed this shift, too; but this time the reason is the complexity of systems. Also Geary (2006, p.75) thinks this shift is “to keep complex systems combat ready.” And according to him DoD top management wants to use PBL for all new systems. Gillie (2006) states that Boeing’s intent by PBL is taking complexity out of their customers operations.

The more complex the systems the more likely owner decides to buy the service. “The increased complexity of products and processes is compelling more and more companies to use structured decision tools, to facilitate strategic decisions to make or buy.” (Bozkurt and Guducu, 2005, p.31) Wharton researchers think that complex systems’ owners such as aerospace and defense need more sophisticated acquisition strategies like PBL partnerships instead of

traditional approaches (Cohen and Netessine, 2007). According to Berkowitz et al. (2003); support becomes complex moving from legacy systems to new systems. Likewise acquisition strategy should move from traditional approach to future strategies such as PBL.

On the other hand for legacy systems close to their end, PBL does not provide any performance or cost improvement.

“PBL can often improve reliability, but there are limitations, particularly on legacy systems. Long-standing, systemic reliability problems in fielded systems are unlikely to be corrected without appropriate commitment of necessary funding. ... In some instances, particularly for legacy systems approaching retirement, PBL may in fact not be the most appropriate support solution.” (Kobren, 2009, p.260-261)

But PBL should be used for legacy systems with sufficient life to decrease costs. Kobren (2010, p.202) recommends using PBL to decrease increasing sustainment costs:

“Supporting and sustaining increasingly complex, often aging weapon systems in an era of budgetary austerity, and faced with a variety of threats and challenges from both state and non-state actors, the department must leverage LCM processes, practices, and policies, coupled with performance based life-cycle product support sustainment strategies to preclude degraded readiness and upward spiraling support costs.”

Goure (2010) supports this idea with NAVICP and Navy’s FIRST examples. According to him PBL helped Navy to deal with obsolescence issue, which is one of the largest issues for Navy. Both programs achieved huge successes.

### **13. Up-Front Planning and Early PBL Implementation**

In sixteen out of eighty one documents it is stated that early decision of PBL will booster success. PBL’s goal is to provide the desired outcomes such as readiness, reliability. It is basically an acquisition strategy for sustainment, support. Outcomes are linked to this support program. “The link between performance and sustainment is critical, and must be considered throughout the early program design activities.” (DoD Designing and Assessing Supportability Guide, 2003, p.8) The guide also mandates PMs starting reliability, availability, and



maintainability activities early in the acquisition cycle. All plans should be done early in the life cycle.

Owner wants to keep the system ready. Therefore support strategies should be considered even at the decision making progress of buying the system. In DoD PMs have the responsibility regarding the support program. “The PM shall establish logistics support concepts (e.g., organic, two- level, three- level, contractor, partnering, etc.) early in the program and refine the concepts throughout program development.” (DoDD 5000.02, 2002, p.82)

DoD does this up-front planning well.

“Including sustainment in new programs means conceptualizing how the system will be sustained as it is being designed, how the modeling capability will be generated, how the system will be serviced in the field, how industry and service branch support personnel will partner in sustaining that asset, and how clearly define of the multiple responsibilities. Ideally, the sustainment plan is developed and in place before any acquisition.” (Hedden, 2007, p.2)

Devries (2004) thinks that this is a significant shift from traditional approach to an early-in-the-life-cycle planning. PBL includes total life cycle management which emphasizes early focus on sustainment in the program management office.

As mentioned before OEMs have advantages. According to Berkowitz et al. (2003), one of the advantages is, OEM may interact early in the development/fielding cycle of the system. They have the ability to play role in the early stages. In that case it would be an important role that may affect performance improvement by means success of PBL. It may even decrease costs. “Application of a PBL strategy from the early stages of product design and development can lead, by controlling the dominating design parameters, to significant reductions in life-cycle costs.” (Sols and Verma, 2007, p.47) DoD Designing and Assessing Supportability Guide (2003, p.8) states that:

“SOE is the composite of performance, availability, process efficiency, and total ownership cost. The objectives of the SOE concept can best be achieved through influencing early design and architecture and through focusing on System Design for Operational Effectiveness (SDOE). Reliability, reduced logistics footprint, and reduced system life cycle cost/total cost of ownership (TOC) are most effectively achieved through inclusion from the very beginning of a program – starting with the definition of required capabilities.”

Five documents used examples to express their support to the ideas above. Table 14 shows the examples used by corresponding documents.

Table 14. Examples used in documents– Up-front Planning, Implementation.

Example	Reference	Key Points
JSF	Blumberg (2006b)	The program was a PBL program from the start. Prior to the start of system design and development (SDD) in fall 2001, fully validated and affordable operational requirements were available. Vitasek and Kotlanger agree that the JSF program is on target with sufficient long-range, up-front planning to provide a high probability of success.
U.S. Army/AAI Unmanned A/Cs	Blumberg (2007a)	The Army's acquisition strategy was to buy an off-the-shelf system. It is a fly-before-you-buy competition, so the product design was complete as part of the proposal process. The Army wanted to field it quickly, learn from soldier experience, then dial it in and modify it for more military utility.
U.S. Air Force Traditional Acquisition Strategy : Test systems in legacy aircrafts	Mitchell (2008)	This is a good example of a system that wasn't particularly well managed in the first place. But the problem isn't just a matter of poor obsolescence planning on the customer's part. It's also a direct consequence of a business model that promotes obsolescence by paying the same vendors who build the systems to maintain them afterwards. These vendors have a financial disincentive to design systems that last longer because they'll make less revenue on the back end. It wasn't the fault of the people who made the system at the beginning. The customer didn't require it to be managed.
Army - ARC-190	Pettingill et al (2004)	The ARC-190's PBL planning team was identified as a best practice for their up-front and early planning. The ARC-190 program is looking at PBL as a means for converting this organically repaired item into a contractor repaired item.
Generic Example: Future Combat Vehicle	Trovato (2004)	Minimum maintenance and onboard support is integrated with design. Early emphasis on design will provide reduction in costs and improved performance.

As seen design is the first piece of up-front planning. One of the courses is given by DAU is about design for sustainment:

“This 3-day course emphasizes the application of engineering and related technical methodologies to optimize the design of systems for supportability, not only at initial fielding but throughout the service life.” (Cothran, 2008, p.36)

Up-front planning and early PBL implementation in the life cycle is a requirement according to Heron (2010). It is the best way to reduce life cycle costs and improve performance. Buyers should pay attention to that, before making the decision to buy a new system.

#### 14. Other Important Points: Risk and Stage of PBL

As mentioned at the beginning of this section; risk and stage of PBL are frequently repeated in literature. Risk is mentioned in twenty eight documents and stage of PBL is mentioned fourteen documents over eighty one. At first sight they seem to be affecting the

success of PBL, but when it is examined in details, it can be easily stated that they are not factors affecting success. Actually they are affecting success via the other factors mentioned earlier.

#### **14.1 Risk**

Risk is included in every type of acquisition. In PBL it is transferred to PSI. PSI absorbs this risk by increasing contract value, length or type. Harada (2010, p.21-24) lists kinds of risks regarding PBL. These risks may be linked to a factor mentioned in this study. ‘Supply chain risks’ will be shared by the partners of PBL; ‘skill drain’ will be handled by PBL teams; ‘assessing’, ‘cost’, ‘price’ and ‘evaluation’ are all matter of data requirement. Contractor will negotiate all with buyer and a fair contract will be initiated. Issues regarding data requirement is also pointed by Newsome (2008).

“Since the contractors are responsible for achieving the performance requirements placed in the statements of work, the majority of the risk related with performance is transferred from government to industry. Agencies should consider this when determining the appropriate acquisition incentives.” (Bozkurt and Guducu, 2005, p.20)

In PBL operational risks are shifted to contractor. To handle this risk contractor should invest and contractor wants to gain profit with this investment.

“PBL contracts are almost always offered across multiple years (lowering financial risk for the vendor), with the expectation that the vendor will assume some degree of operational risk. Figure 3 shows the expected assumption of operational risk by the vendor.” (Doerr et. al, 2005, p.170)

Cohen and Netessine (2007) points out the uncertainties especially in complex systems. According to them this type of risk can be averted by contract type; using cost plus contracts instead of fixed price. Blumberg (2007a) states so; contracting negotiations will take care of risks involved. “When properly designed, a PBL contract will actually diminish the risks borne by both partners.” (Vitasek and Geary, 2007, p.1)

Gardner's (2008) study shows that PBL users believe that all types of risks such as lack of data, financial, return of investment, rapid change of costs, etc. can be altered by incentives such as contract length, award terms, and type of contract. According to him buyer and contractor should negotiate and share the risks. Kobren (2009) agrees regarding the incentives. According to Sols and Verma (2007); risk will be absorbed through contractual framework. Kim et al. (2006) tried to find out the best contract to handle risks. Their formulation includes the factors that affects success and link them to risk factor.

Another absorber will be competition. PMs should use an open systems approach to achieve mitigating "the risks associated with technology obsolescence, being locked into proprietary technology, and reliance on a single source of supply." (DoDD 5000.02, 2002, p.83)

DoDD 5000.02 (2002) mandates risk management and states that using best practices, best capabilities will reduce the risk. Therefore applying best practices is another absorber.

Lessons Learned (2004) shows that partnership, strategic alliance has reduced the program risks especially for JSTARS. According to Lessons Learned (2004) sharing risk with partnership is another way to handle risks; Navy Aircrew Survival Equipment had this experience. Vitasek et al. (2007) agree; partnership, sharing risk are helpers to reduce risks.

According to Vitasek and Geary (2008) flexibility will balance the risks involved.

As a result risk is affecting success of PBL but it affects through the other factors.

#### ***14.2 Stage of PBL***

"There are four levels for PBL:

Level 1: components such as aircraft tires,

Level 2: major subsystems such as aircraft engines,

Level 3: platform availability such as F-117 Nighthawk, and

Level 4: Mission, setting the stage for the future—achieving true pay for performance such as the Army shadow tactical unmanned aerial vehicle program." (Harada, 2010, p.25)

Vitasek et al. (2006a), Kratz and Buckingham (2010a) define four levels likely and give similar examples in details. Owners should determine which level is appropriate for them. Doerr et. al (2005) thinks this categorization as a level of commercial involvement.

Gardner's (2008) study shows that stage of PBL will affect negotiations a little regarding contract length, award terms, and type of contract. Similarly awarded PBL's have a long range from level 1 to level 3. (There is not any level 4 PBL yet.) "The DoD has credited PBL with a long string of successes, ranging from logistics support for simple parts such as tires to subsystems such as engines — and in some cases, to full weapon systems." (Newsome, 2008, p.5; Vitasek and Geary, 2007, p.1)

On the other hand stage of PBL will affect the implementation processes, partnership, and alliances. Cothran (n.d.) points this out but he does not conclude any effect on success of PBL. "Performance based arrangements are successful at the component, subsystem, and system level, depending upon the unique circumstance of the system." (Kratz and Buckingham, 2010a, p.61)

Consequently stage of PBL doesn't have any effect on success. It may affect type, properties of contacts. DoD achieved numerous successes in every stage.

### III. Methodology

#### Overview

In this section the tool for conformity assessment of PBL is built according to the literature review which provided for thirteen factors that have an effect on success of PBL. How these factors are affecting success is explained in literature review, too. Therefore, qualitative information is in hand so far.

This tool assumes a linear relationship between the success of PBL and each factor. To build the tool, qualitative information, ideas from the literature are converted to quantitative scales to evaluate each factor. To get a score from these scales, the user should answer the questions asked by the tool regarding each factor; therefore, a more objective evaluation may be obtained. The tool also lets the user make his/her own evaluation; a subjective one. In addition to those evaluations, each factor is given a weight corresponding to their occurrence frequency in the sample literature and also another weight for their importance as explained in the literature. The tool also lets the user determine a customized weight. The basic formulation is below:

$$f(x) = \sum_{n=1}^{13} w_n \cdot x_n \text{ where } \begin{cases} x_n \text{ score from evaluation of } n^{th} \text{ factor} \\ w_n \text{ is the corresponding weight} \end{cases}$$

Scores range from 0 to 10 and the sum of all weights is equal to 1. The general formula for occurrences' frequency weight is:

$$w_n = \frac{\# \text{ of occurrences in the literature sample}}{\Sigma \# \text{ of all factors' occurrences in the literature sample}}$$

As a result; the tool concludes 6 (= 2 scores x 3 weights) calculations. These are:

$$\begin{aligned} f(x) &= \text{user determined evaluation} \times \text{user determined weight} (w_{\text{user},n}) \\ f(x) &= \text{user determined evaluation} \times \text{occurrences' weight} (w_{\text{occurrences},n}) \\ f(x) &= \text{user determined evaluation} \times \text{author determined weight} (w_{\text{author},n}) \\ f(x) &= \text{tool evaluation} \times \text{user determined weight} (w_{\text{user},n}) \\ f(x) &= \text{tool evaluation} \times \text{occurrences' weight} (w_{\text{occurrences},n}) \end{aligned}$$

$$f(x) = \text{tool evaluation} \times \text{author determined weight } (w_{\text{author},n})$$

The tool is pictured at Appendix B. The following subsections are describing each factors' scales, how to assess them and their weight calculation. And the last subsection describes general score calculation and other specifications of the tool.

## **1. Reduction in Total Cost of Ownership, Life Cycle Cost**

Cost avoidance is significant for many of the PBL programs. TOW-ITAS PBL program's cost avoidance ranges from 25.82% to 60.58% per year from 2001 to 2005; approximately 33% over 7 years. In GE F404, Navy experienced 13.8% total cost of ownership reduction. Shadow UAV PBL program achieved 28% contract cost reduction; F-22 program achieved 40 %, Tornado achieved 30%; JAVELIN is estimated to achieve 10% and E-3D AWACS is estimated to achieve 12% total cost reduction.

Another point that may affect total cost for organization may be reducing human resources requirement by PBL teaming. F-117 PBL program is an example for that. 18.11% reduction in employee requirement was achieved in addition to maintenance cost reduction.

Another savings has been experienced in inventory reduction. APU PBL program is the best example to understand it. While \$35 million savings is achieved in total costs savings, \$8.5 million cost avoidance is occurred in inventory annually. That means 24.29% of total costs savings is generated by inventory reduction. In GE F404 Navy experienced 21% inventory reduction. In NAVICP A/C tire PBL program the inventory reduction is huge; 75%. By Tornado radar support PBL program inventory went down to 50%.

As a result; the minimum expected total cost reduction is 10% and the maximum achieved is 40% over programs' length. Evaluation scale is proportional to this range. Zero percentage; any change in total cost of ownership will get 0 and 10 goes to expectation of 40 or

more % reduction in total cost of ownership. In most cases, military do not take human resource requirement or inventory into account while calculating total costs. Therefore tool offers user to evaluate these sub-items, in exchange of first question. Selecting any percentage except not applicable (N/A) option, will direct user to use only total cost reduction in assessment calculations. Otherwise it is offered to fill ‘contract cost reduction estimation’, ‘human resource reduction expectation’ and ‘inventory reduction expectation’. ‘Contract cost reduction estimation’ is scaled just like ‘total cost reduction estimation’; 0%, there is not any change in total cost of ownership will get 0 and 10 goes to expectation of 40 or more % reduction in total cost of ownership. And this sub-item creates the 50% of this factor’s score. For ‘human resource reduction’ scale, F-117 PBL program is taken as reference. 18% or more reduction will get 10 and other entries lower than 18% will get proportional values. For inventory 25% and more reduction will get 10 and other entries lower than 25% will get proportional values. These two sub-items creates the other half of this factor’s score.

Cost reduction is one of the most reoccurring factors. Its occurrences’ weight will be the highest.

$$w_{occurrence,1} = \frac{\# \text{ of occurrences in the literature sample}}{\Sigma \# \text{ of all factors' occurrences}} = \frac{60}{481} = 12.47\%$$

Although most of the documents count this factor as one of the purposes of PBL, DoD defends itself against GAO reports by stating PBL’s aim is not reducing costs, it is improving performance, reliability, readiness. In addition to that as stated in literature review section, authorities find national security, soldiers’ safety more important than costs, budget issues. Therefore this factor’s weight should be lower than the occurrences’ weight. The weights of all factors range from 3% to 12%. 7.69% is the equally shared weight among 13 factors. 5% is determined to have a fair weight for this factor.



$$w_{author,1} = 5\%$$

As mentioned before the user may give his/her own weight to this factor:

$$w_{user,1} = \textit{will be determined by user}$$

## 2. Presence, Determination of Metrics, Performance Outcomes

Performance outcomes, metrics are the key components of PBL. PBL is an acquisition method which buys performance. Therefore first rule is identifying the performance requirement accurately. Metrics, outcomes should be aligned to goals of the systems, organization. Metrics should be understandable, clear, specific, traceable and measurable such as in terms of quality, timeliness, quantity, etc. Metrics should be negotiated by all partners to be fair to all.

Subject matter experts suggest to use 5 top level metrics; operational availability, operational reliability, cost per unit usage, logistics footprint and logistics response time. Metrics should be related to them at least. In addition to them; customer satisfaction is mentioned as a metrics by a couple of authors.

Buyer tries to buy outcomes; therefore s/he should have a baseline and a target to reach. Having a baseline is related to historical data. But a target value should be set for metrics.

Early implementation of metrics is another suggestion by some authors regarding determination of metrics, but this is an issue regarding ‘up-front, early planning’ factor.

Subject matter experts also suggest using 5 or less metrics to focus on what is required, not to lose insight of main goal.

According to the information above summarized from literature review; 11 key questions are gathered to assess ‘metrics determination’ factor. Table 15 lists these questions.

Table 15. Questions for Presence, Determination of Metrics.

No	Question
1	How accurately are the requirements of goods/service defined?
2	How well are the metrics aligned to organization's goals?
3	How clear, understandable, solid, specific are the metrics?
4	How realistic, sound are the metrics?
5	How traceable are the metrics?
6	How measurable are the metrics?
7	Are the metrics negotiated with candidates?
8	How fair are the metrics for all partners?
9	Are metrics expressed in any of five top level metrics?
10	Is a target value set for each metrics?
11	How many metrics are planned to use in contract?

Each question has similar importance in evaluation. Therefore they are weighted equally. Each question has a score range of 0-10, so do Yes/No questions. 0 means not at all and 10 means extremely. For 11<sup>th</sup>; 5 or less will get 10, more will get 0. The score for the factor is the mean of all scores.

Metrics determination is one of the most reoccurring factors. Its occurrences' weight will be high.

$$w_{occurrence,2} = \frac{\# \text{ of occurrences in the literature sample}}{\Sigma \# \text{ of all factors' occurrences}} = \frac{56}{481} = 11.64\%$$

Metrics is the key of PBL; therefore its weight should be in accordance with its importance. The weights of all factors range from 3% to 12%. 7.69% is the equally shared weight among 13 factors. 12.5% is determined to have a fair weight for this factor:

$$w_{author,2} = 12.5\%$$

As mentioned before the user may give his/her customized weight to this factor:

$$w_{user,2} = \text{will be determined by user}$$

### 3. Performance Improvement

The very most intent of PBL is improving desired metrics. That is not only what DoD states, but also what subject matter experts admit. Literature has several examples for this factor. To create a scale some of them are examined in this section, too. There is also some emphasis on designing, redesigning and suggests on early implementation for improving metrics; but these are subjects of ‘up-front, early planning’ factor.

In GE F404, Navy experienced 46% fleet availability improvement, 49% component availability improvement. APU PBL program has similar achievements; around 30% availability improvement, 15% reliability improvement (30-60% reliability improvement is guaranteed in contract). For F/A-18E/F FIRST Program; 16% MICAP rate improvement, 18% aircraft availability improvement are announced. A/C Tires PBL program increased availability by 17%, delivery time improvement by 10%. In F-117 program; time on wing increased by 85%, response time decreased by 71%, and turn times decreased by 25% for engine, 43% for LRUs. FLIR experienced 40% improvement in system reliability, and 14% availability improvement. Table 16 summarizes these examples to provide a better view for scale range.

Table 16. Performance Improvements for successful PBL programs.

Improvement \ PBL Program	GE F404	APU	FIRST	F-22	A/C Tires	F-117	FLIR
Top Level Metrics Improvement	46%	30%	16%	15%	10%	85%	40%
Top Level Metrics Improvement	49%	15%	18%	15%	17%	71%	14%
Top Level Metrics Improvement	-	30-60%	-	68%	-	25-43%	-

Although the average percentage improvement is 35% according to the table; A/C tires PBL program is counted as successful with a 10% and 17 % improvement. Therefore for this factor 10 point goes to 20% and more improvements; lower improvement ratios will get proportional points for each metrics used in contract. As mentioned before; literature advises to

use 5 or less metrics. Therefore the first 5 metrics is scored individually and for others user should give an average improvement ratio.

This factor is mentioned a lot in the literature, too. Therefore occurrences' weight will be correspondingly high.

$$w_{occurrence,3} = \frac{\# \text{ of occurrences in the literature sample}}{\Sigma \# \text{ of all factors' occurrences}} = \frac{52}{481} = 10.81\%$$

PBL's one of the intent is increasing performance metrics. Therefore although occurrences' weight is correspondingly high, it should be weighted higher, as high as 'metrics determination'.

$$w_{author,3} = 12,5\%$$

As mentioned before the user may give his/her own weight to this factor:

$$w_{user,3} = \text{will be determined by user}$$

#### **4. Partnership, Strategic Alliance**

PBL is a partnership, an alliance. PBL requires more sophisticated, complex relationships than traditional methods. It's not a business relationship, not a traditional arm's length relationship anymore. According to the literature; a PBL environment should at least have long term relationships, and strategic alliances have the best practices. Examples of successful PBL partnerships are several. According to these examples; partnerships include integration with partners, trust among partners, knowledge sharing, and even physical assets/network sharing. Sharing risks and benefits is also essential. It requires a closed managed relationship. This is a culture change, therefore not only management's support but also employees' contribution is required.

Tool has two ways to evaluate this factor. One of them is just selecting the expected level of relationship for that specific acquisition. It includes 6 different options from ‘Traditional Arm’s Length Relationships’ to ‘Strategic Alliance’. Table 17 shows the corresponding scores.

Table 17. Scores for Types of Relationships.

<b>Relationship</b>	<b>Score</b>
Traditional Arm’s Length	0
Close - Short Term Relationship	2
Long Term Relationship	5
Limited Partnership	7
Partnership	8
Strategic Alliance	10

PBL requires at least long term relationships and as stated above strategic alliances have the best practices. Arm’s length relationships do not have any contribution to PBL. Other 4 types have corresponding scores according to this information.

Traditional arm’s length is the oldest way of supplier-buyer relationship, where you do not pay attention to manage or improve relations. Close-Short term relationship represents a better relationship than traditional approach, some information may be shared, and improvements might be seen in relations. Long term relationship represents where communication processes got more formal, commitment might be seen between supplier and buyer. Limited partnership is a kind of partnership but in this case all of the resources are not combined to reach the mutual goal. Partnership is an agreement that buyer and supplier commit themselves to reach mutual goals, benefits. Strategic alliance is the expanded version of partnership; partners set their vision, strategy through the mutual objectives, this is synergy.

The other way, offered by tool, is to evaluate this factor via assessing sub items of partnership. Each item has a score range of 0-10 and has equal weight for evaluation result. 0 means not at all and 10 means extremely. Sub items are listed in table 18. User should answer all.

Table 18. Questions for Relationships Evaluation.

No	Question
1	What type of relationship is expected to be built with provider?
2	How much integration is expected to be built with provider?
3	How trustful are the partners to each other?
4	How much information is planned to be shared with partners?
5	How much of physical network is planned to be shared among partners?
6	How much risk will be shared among partners?
7	How much of benefits will be shared among partners?
8	How well the relationships are managed?
9	How supportive is the management to culture change?
10	How acceptable is this culture change among employees?

This factor is mentioned a lot in the literature, too. Therefore occurrences' weight will be correspondingly high.

$$w_{occurrence,4} = \frac{\# \text{ of occurrences in the literature sample}}{\Sigma \# \text{ of all factors' occurrences}} = \frac{49}{481} = 10.19\%$$

Partnership is a key for PBL. Therefore it is so important. But the literature gives it an adequate emphasis. As a result a similar weight is given by author.

$$w_{author,4} = 10\%$$

As mentioned before user may give his/her own weight to this factor:

$$w_{user,4} = \text{will be determined by user}$$

## 5. Length of Contract

PBL requires long term relationships with partners; therefore the contract length should be long enough to provide this kind of relationship. Subject matter experts agree that the most incentive factor is contract length for balancing risk and up-front investment. And also buyer's intent is having long term support by PBL. It is also agreed that shorter term contracts limit PBL at all. So the question is 'How long contract length should be for a successful PBL?'

Detailed studies show that 5 years base contracts with award/option terms will satisfy all partners with return on investment and desired outcomes. A five years base contract is agreed by both organic and commercial representatives to get benefits. Literature is full of benefits of multi-year contracts as mentioned in previous sections. On the other hand it is also determined that a ‘less than 3 years contract’ is not beneficial for either of partners. HIMARS is the only successful example for 3 years contracted PBL.

Providers’ will is to get returns on investment and cash flow continuity, while buyer would like to have a sufficient performance level of desired outcome.

Opposers state that very long term contracts limit the flexibility of buyer, competition in market. Therefore extremely long contracts are not well enough either, although they had success as in Survey King, and Merlin programs in U.K. Besides competition is an issue regarding another factor; ‘candidates and competition’.

Consequently; less than 3 years contract will get 0; 3 to 5 years will get 4 and 5 points respectively; 5 to 10 will get ‘5+proportional points’ up to 10 points; 10 years and more will get 10 points. If the contract’s length in years is not seemed to be an appropriate way to assess this factor, user may select to evaluate benefits to get a score. All benefits have a score range of 0-10 and have equal weight for evaluation result. 0 means not at all and 10 means extremely. The sub items should be answered are; return on investment allowance, cash flow continuity for provider, and the sufficiency of the contract length to accomplish a certain performance level of the desired outcomes.

Contract length is mentioned a lot in the literature sample as an effective key success driver. Its occurrences’ weight will be correspondingly high.

$$w_{occurrence,5} = \frac{\# \text{ of occurrences in the literature sample}}{\Sigma \# \text{ of all factors' occurrences}} = \frac{41}{481} = 8.52\%$$

A similar weight is given by author.

$$w_{author,5} = 9\%$$

As mentioned before the user may give his/her own weight to this factor:

$$w_{user,5} = \text{will be determined by user}$$

## 6. Flexibility

As mentioned before; PBL's purpose is buying outcomes, not dictating what to do. In PBL environment it is advised to tell the contractor what is needed, not how to achieve it. As long as the buyer gets what s/he wants, contractor has the flexibility how the support is provided. PBL allows partners to use their knowledge, innovation, experience. By PBL responsibilities and authorization is decentralized to innovate and apply their skills. Providers should be empowered. There is a necessity of freedom for contractor's actions to do what s/he does best. Freedom is also required in investment for contractor against ambiguity and risk. This is a chance for contractor to decide how to provide the requirements. Buyer wins, too; s/he will get what is desired.

Besides to use PBL with full capacity not only 'how to do' specifications should be eliminated but also financial, political, statutory barriers should be taken care of.

According to the information above, tool asks user the questions shown in table 19.

Table 19. Questions for Flexibility.

No	Questions
1	How much freedom is provided for contractor's actions?
2	How much decentralized is the authority?
3	How much decentralized are the responsibilities?
4	How constraining are the acquisition plan and the terms with specifications, 'what' and 'how to do's'?
5	How constraining are financial, political, statutory barriers?



Each has 0-10 score range. 0 means not at all and 10 means extremely. The evaluation score will be average of the five questions' answers. 5<sup>th</sup> and 6<sup>th</sup> questions are barriers for flexibility; therefore their score will influence overall score negatively. They are converted automatically by the tool.

Flexibility's weight of occurrences will be in the middles.

$$w_{occurrence,6} = \frac{\# \text{ of occurrences in the literature sample}}{\Sigma \# \text{ of all factors' occurrences}} = \frac{39}{481} = 8.11\%$$

This is an important factor for PBL. A slightly higher weight is given by author.

$$w_{author,6} = 10\%$$

As mentioned before the user may give his/her own weight to this factor:

$$w_{user,6} = \text{will be determined by user}$$

## **7. Better Service, Best Value Creation, Best Practices**

PBL is integration of partners to find the way to reach best practice. It is the combination of all organic and commercial abilities. As mentioned before; abilities include managing life cycle systems engineering influence, directing supply chain management decisions, and trying to meet the operational sustainment metrics. In addition to skills; knowledge and experience regarding the system are important. The other important factor that some authors emphasized is quality of manpower. It is also important to find the best mix of qualified personnel. For organic structure skilled personnel is required not only for the job to be done, but also for acquisition processes.

Cooperation of organic and commercial elements should be aligned. Work allocation should be done according to who does the best job.

Depending on this information 14 questions are asked to the user. Table 20 lists the questions.

Table 20. Questions for Better Service, Best Value Created, Best Practices.

No	Question
1	How well will the expected service quality be provided by organic structure in this partnership?
2	How well will the expected service quality bw provided by commercial structure in this partnership?
3	How capable is the organic structure to manage life cycle of systems?
4	How qualified is the organic structure for directing supply chain?
5	How knowledgable is the organic structure about system?
6	How experienced is the organic structure about system?
7	How skilled is the organic manpower regarding job to be done?
8	How skilled is the acquisition personnel regarding job to be done?
9	How capable is the commercial structure to manage life cycle of systems?
10	How qualified is the commercial structure for directing supply chain?
11	How knowledgable is the commercial structure about system?
12	How experienced is the commercial structure about system?
13	How skilled is the commercial manpower regarding job to be done?
14	How well is the work allocation done between partners according to best practices?

Each has 0-10 score range. 0 means not at all and 10 means extremely. The first two questions ask the service quality of both organic and commercial structure and directly evaluate the factor by taking average of these two. For commercial structure user should decide the level among the candidates according to their probability of being the partner. S/he may decide to use the most possible candidate's score, weighted score or average of all. If user prefers to evaluate by sub questions, the evaluation score will be average of these answers. And again for commercial structure user should decide the score among the candidates according to their probability of being the partner.

This factor's weight of occurrences will be in the middles, too.

$$w_{occurrence,7} = \frac{\# \text{ of occurrences in the literature sample}}{\Sigma \# \text{ of all factors' occurrences}} = \frac{38}{481} = 7.9\%$$

Literature gives adequate emphasis on this factor. Therefore a similar weight is given by author.

$$w_{author,7} = 8\%$$

As mentioned before the user may give his/her own weight to this factor:

$$w_{user,7} = \text{will be determined by user}$$

## 8. PBL Experience, Awareness and Training

PBL is a new culture, a transition from traditional approaches. The organizations should deal with implementation when entering PBL environment. The most effective way for an implementation is making use of others' experience.

Not only partners' employees but also acquisition personnel of buyer should be aware of what PBL is. Subject matter experts support a continuous education, training for PBL. The more you learn the better job you do. As stated above, this is a culture change and for a culture change managements' commitment is required.

Depending on this information 7 questions are asked to the user. Table 21 lists the questions.

Table 21. Questions for PBL Experience, Awareness and Training.

No	Question
1	How experienced is the 1st partner (organic) in PBL?
2	How experienced is the 2nd (commercial) partner in PBL?
3	How experienced is the 3rd (commercial) partner in PBL?
4	How experienced are the other commercial partners in PBL as an average?
5	How much importance is given to educational programs/training for PBL in partnership?
6	How trained/knowledgable is the acquisition personnel about PBL?
7	How committed is the managements for the culture change?

Each question has 0-10 score range. 0 means not at all and 10 means extremely. The first four questions ask the PBL experience level of all partners depending on the number of partners. User should give an average level for the 4<sup>th</sup> question for 4 and more partners. Organization itself is a partner, too. The evaluation score for this factor has two equally weighted elements; average

of partner's experience by means first 4 questions answers and average of other sub factors by means last 3 questions answers.

This factor's weight of occurrences will be in the middles, too.

$$w_{occurrence,8} = \frac{\# \text{ of occurrences in the literature sample}}{\Sigma \# \text{ of all factors' occurrences}} = \frac{34}{481} = 7.07\%$$

To make PBL successful, a well-implemented culture change is required. Therefore it should have more importance, more weight. A slightly larger weight is given by author.

$$w_{author,8} = 9\%$$

As mentioned before the user may give his/her own weight to this factor:

$$w_{user,8} = \text{will be determined by user}$$

## 9. Innovation

Innovation, creativity is a fundamental element of PBL, especially regarding performance metrics improvement. Buyers' intent for flexibility is almost just for innovation. Innovation is another skill, that contractor should have in addition to his/her knowledge and experience. S/he should use the given freedom for innovative approach to have better results regarding metrics. Literature is full of encouragements for innovation especially in DoD. Also subject matter experts agree that innovation is a success key booster in PBL.

Although literature gives bunch of examples and states much importance on this factor, it does not give insight how to assess innovation. For the tool; a summary of Dyer, Gregersen and Christensen's (2011) questions and survey is used. According to them innovative organizations have two skills; discovery and delivery. PBL's innovation is dealing with discovery part, because delivery part just includes delivering the innovative products/solutions. They also figured how an innovative organization should be. Figure 10 shows how "innovative companies build the code

for innovation right into the organization's people, processes, and guiding philosophies.” (Dyer et al., 2011, p.170)

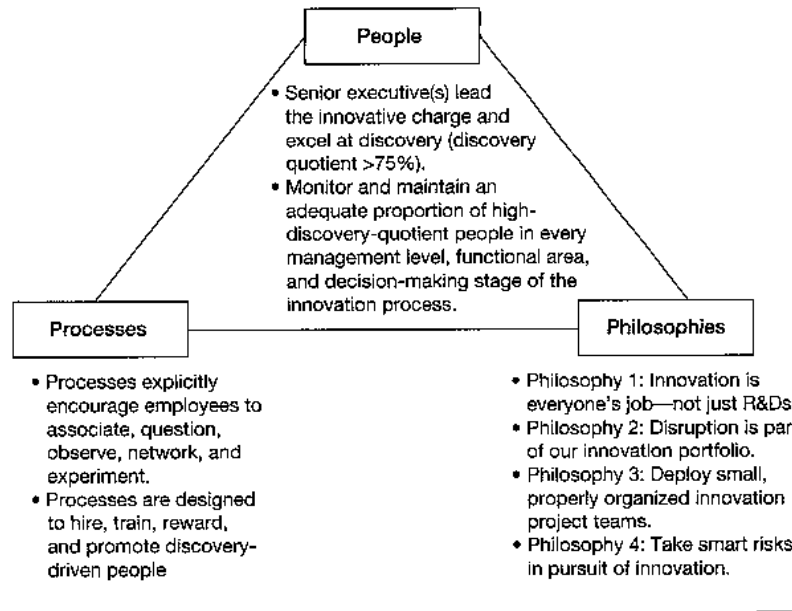


Figure 10. Innovative Organization Structure (Dyer et al., 2011, p.170).

Those are three elements of organization structure. According to this, 10 question survey is created by them. A summarized version of this survey and a similar scale are used to evaluate innovation.

Evaluation of this factor includes equally weighted two parts; one of them assesses innovation regarding the information at the beginning of this sub-section, the other is the adopted survey. Table 22 lists the questions.

The first 3 questions are for the first part, others are for the second. Each question has 0-10 score range. 0 means not at all and 10 means extremely. Scores of each part and allover score are the average of given answers. The only exception regarding scoring is the first question. It's converted automatically by the tool due to its negative effect. User should answer them according to his/her knowledge about candidates. User should decide how to assess candidates

when answering questions. If the answer is unknown, user may select N/A and the average does not include that question/answer.

Table 22. Questions for Innovation.

No	Question
1	How constraining are the terms blocking innovational approaches?
2	How incentivizing are the terms encouraging innovational approaches?
3	How much freedom is present to encourage innovational approaches?
4	People: How capable are the employees regarding well-known record of generating innovative ideas in this partnership?
5	People: How important is screening innovation skills in hiring process in this partnership?
6	People: How important will innovation be as a factor at employees' performance evaluations in this partnership?
7	Process: How frequently will brainstorming and generating new ideas take place in this partnership?
8	Process: How important will 'challenging the status quo/conventional ways' be in this partnership?
9	Process: How interactive will this partnership be for seeking opportunities with customers, competitors, suppliers, etc.?
10	Process: How spreaded will 'the networking through outside of this partnership' be for new ideas?
11	Process: How supportive will this partnership be for adopting pilot programs or experiments?
12	Philosophies: How encouraging will this partnership be to employees to offer creative ideas?
13	Philosophies: How supportive will this partnership be to risk taking for new ideas?

Literature emphasized on this factor sufficiently.

$$w_{occurrence,9} = \frac{\# \text{ of occurrences in the literature sample}}{\Sigma \# \text{ of all factors' occurrences}} = \frac{28}{481} = 5.82\%$$

Innovation is a success key especially for improving metrics. A similar weight is given by author.

$$w_{author,9} = 6\%$$

As mentioned before the user may give his/her own weight to this factor:

$$w_{user,9} = \text{will be determined by user}$$

## 10. Data Requirement

PBL is buying performance according to in advance-set performance values defined in the contract. To set a value, past experience, historical data is required. 'To obtain such data' is almost impossible for new systems. Some authors determined that 2 years' of data is required for the success of a legacy system PBL. Not having accurate, adequate data will increase risk, shared by partners. Data is needed for historical and present performance and also for cost estimation.

Present data is required to assess the performance metrics, calculate the payment. Buyer must have the ability to reach the data at any given time. These procedures should not be blocked by any progress. In addition to that buyer should have the necessary tools to keep track.

Depending on this information 11 questions are asked to the user. Table 23 lists the questions.

Table 23. Questions for Data Requirement.

No	Question
1	How adequate is historical data?
2	How accurate is historical data?
3	How adequate is cost data?
4	How accurate is cost data?
5	How adequate will the expected recent data be for metrics` evaluation?
6	How accurate will the expected recent data be for metrics` evaluation?
7	How many years of performance data is in hand?
8	How attainable will the expected recent data/values of metrics be?
9	How timely is the data management as a level of real time?
10	How adequate are the data collection tools?
11	How sufficient is the market for cost estimation?

Each question except seventh has 0-10 score range. 0 means not at all and 10 means extremely. Seventh question asks the user to determine how many years of data are in hand. 2 years and more data will get 10, others will get proportional points. User should give answers to all. The evaluation score will be average of the answers.

Literature gives sufficient emphasis on this factor.

$$w_{occurrence,10} = \frac{\# \text{ of occurrences in the literature sample}}{\Sigma \# \text{ of all factors' occurrences}} = \frac{27}{481} = 5.61\%$$

A slightly lower weight is given by author.

$$w_{author,10} = 5.5\%$$

As mentioned before the user may give his/her own weight to this factor:

$$w_{user,10} = \text{will be determined by user}$$

## **11. Competition and PSI Candidates**

Competition is important for PBL as for other acquisition methods. It drives candidates to be cheaper and/or better. PBL's one of the purposes is also maximizing competition with provided flexibility, freedom. It's mandated by regulations, policies. There should not be any block to prevent competition. Policies also points to consider alternative systems to meet requirements. Buyer should think globally; qualified international sources should have the opportunity to be a candidate.

One of the most important things for competition is willingness. Buyer should find contractors who are willing to accept the PBL strategy.

Literature mentions about possible candidates for PBL and also mentions about their advantages/disadvantages regarding their experience, knowledge, etc. But this is a subject of 'skills of partners, best practices' factor. But there may be an exception, here. In case of having just one candidate for the acquisition, OEM or prime vendor can achieve the performance requirements, although there is not any competition.

It is hard to manage many suppliers. Therefore system level PBL under an umbrella with a PSI is better for success. Experiences show that; few suppliers are good for PBL. Buyer would like to go for at least system wide PBL programs. Successful PBL examples vary within 1 to 4 partners.

Depending on this information 6 questions are asked to the user. Table 24 lists the questions.

First question's answer is converted due to negative effect. Second, third and fifth questions are 'Yes/No' questions. 'Yes' will add 1 more point to the overall score; 'No' will not add any. Fourth question has a scale of 0-10. 0 means not at all and 10 means extremely. Last



question is the number of possible partners including the buyer. Answers; 2, 3, 4, 5, 6 or more will get 10, 8, 6, 4, 2, 0 respectively. Overall score for evaluation of this factor is calculated by taking average of questions 1, 4, 6 and adding the points gained by questions 2, 3 and 5. If the result is larger than 10, the tool will not give more than 10.

Table 24. Questions for Competition and PSI Candidates.

No	Question
1	How constraining are the terms blocking competition?
2	Are alternative systems considered to meet requirements?
3	Are qualified international sources permitted to enter?
4	How sufficient is 'the number of candidates' willing to enter PBL partnership?
5	In case of sole candidate; is the candidate OEM/Prime Vendor or other?
6	How many partners are present in PBL including buyer?

More than 25 percent of the sample literature emphasized on this factor.

$$w_{occurrence,11} = \frac{\# \text{ of occurrences in the literature sample}}{\Sigma \# \text{ of all factors' occurrences}} = \frac{24}{481} = 4.99\%$$

Literature gives more importance than it is required by this factor. All acquisition strategies need competition somehow. A lower weight is given by author.

$$w_{author,11} = 3.5\%$$

As mentioned before user may give his/her own weight to this factor:

$$w_{user,11} = \text{will be determined by user}$$

## 12. Properties of System

Literature concludes not every acquisition fits in PBL. PBL is mostly good for new, strategically important, high-tech, complex, long life, capital intensive systems. And PBL is not good at all either for legacy systems at their end of lives, or for highly reliable systems. But PBL is recommended for capital intensive systems. If insourcing required lots of investments, PBL would rather be preferred.

Depending on this information 7 questions are asked to the user. Table 25 lists the questions.

Table 25. Questions for Properties of System.

No	Question
1	Is contract's subject a new goods/service?
2	How critical is the goods/service regarding strategic importance?
3	How technologically advanced are the requirements regarding the goods/service?
4	How complex is the goods/service?
5	What is the percentage of expected life left on goods/service?
6	How reliable is the goods/service?
7	How much investment is required for insourcing?

First question is a 'Yes/No' questions. 'Yes' will add 1 point to the overall score; 'No' will not add any. Others except fifth question have 0-10 point scale. Fifth one needs an answer in percentage. 100% gets 10 points. Only sixth question has a negative effect and it is converted automatically in calculations. Overall score will be the sum of last 6 answer's average and 'Yes/No' answer. If the score goes over 10 due to this summation, the tool will give 10 maximum.

Literature does not emphasize this factor much.

$$w_{occurrence,12} = \frac{\# \text{ of occurrences in the literature sample}}{\Sigma \# \text{ of all factors' occurrences}} = \frac{17}{481} = 3.53\%$$

This is a dominant factor to determine an acquisition method. On the other hand it is not mentioned a lot in the literature, although in some cases authorities emphasized. A higher weight is given by author.

$$w_{author,12} = 6\%$$

As mentioned before the user may give his/her own weight to this factor:

$$w_{user,12} = \text{will be determined by user}$$

### 13. Up-Front Planning and Early PBL Implementation

Early decision of PBL, will booster success of the sustainment program. Owner wants to keep the system ready. Therefore support strategies should be considered even at the decision making progress of buying a new system. As seen this factor is only applicable for new systems.

Early implementation includes well implementation of sustainment processes regarding design, sustainment in the field, partnership and responsibilities.

Depending on this information 6 questions are asked to the user. Table 26 lists the questions.

Table 26. Questions for Early Planning of PBL.

No	Question
1	Is 'PBL decision' given early in acquisition of system?
2	Is 'sustainment of the system as it is being designed' well-planned up-front?
3	Is 'service of the system serviced in the field' well-planned up-front?
4	Is 'partnering of industry and service branch support personnel in sustaining that asset' well-planned up-front?
5	Is 'determination of the multiple responsibilities' well-planned up-front?

All questions are 'Yes/No' questions. 'Yes' represents 10 points and 'No' 0. Overall score has two elements due to their importance; the first answer and the average of last five questions. User should answer them all. These questions are not applicable for legacy system PBLs.

Literature emphasizes this factor well.

$$w_{occurrence,13} = \frac{\# \text{ of occurrences in the literature sample}}{\Sigma \# \text{ of all factors' occurrences}} = \frac{16}{481} = 3.33\%$$

A similar weight is given by author.

$$w_{author,13} = 3\%$$

As mentioned before the user may give his/her own weight to this factor.

$$w_{user,13} = \text{will be determined by user}$$

Another effect of this factor is changing the weights of all factors in case of deciding PBL for a legacy system. Because this factor is not applicable to new systems. Total number of all factors' occurrences goes from 481 to 465. Table 27 lists the new weights for occurrences' frequency and author's determination, which will be applied to legacy system PBL evaluations automatically by the tool.

Table 27. Weights for Legacy Systems.

Factor #	Weight	
	Occurrences	Author
1	12.90%	6.00%
2	12.04%	13.00%
3	11.18%	13.00%
4	10.54%	11.00%
5	8.82%	9.00%
6	8.39%	10.00%
7	8.17%	8.00%
8	7.31%	9.00%
9	6.02%	6.00%
10	5.81%	5.50%
11	5.16%	3.50%
12	3.66%	6.00%
TOTAL	1.00	1.00

#### 14. General Score and Specifications

The tool calculates each factor's score and state them in the results spreadsheet. General score is the total of each score. According to the author weighted tool score; tool states a percentage of how well PBL fits this acquisition and also made a comment for a better understanding. Comments are listed with their corresponding scores in table 28.

Table 28. Comments of the Tool.

Score	Comment
[0-1]	Definetely do not use PBL as an acquisition strategy.
(1-4]	PBL might not be the best acquisition strategy.
(4-6]	PBL might me considered as an acqusition strategy. But detailed Business Case Analysis is required.
(6-8]	PBL is advised as an acquisiton strategy.
(8-10]	Definitely use PBL as an acquisition strategy.

In addition to those comments if author weighted tool score is below 8, tool points out which factors should be paid more attention for a better PBL.

The tool has several and variety of logical controls. These will help user in case of wrong selection. Results sheet will state which portion of evaluation form should be corrected by pointing out number of factor.

An instructions sheet is implemented in the tool. To reach that sheet a button is present at the evaluation form sheet. User may use these linked buttons to reach the desired sheet. Three linked buttons are present for; evaluation form, instructions and result. There is another button in the evaluation form called reset. This is a macro which resets all the cells to their original value. There are also up-arrow buttons, which might be used to go top of the selected sheet.

The cells which are not for use of users are locked to prevent any wrong selection, fault. Data spreadsheet, which has the calculations in it, is hidden for same purposes. Gridlines, headings and unused cells are hidden for a better view. Cells are filled in colors for same purposes.

#### **IV. Application, Results, and Analysis**

In this chapter the tool, which is created in methodology, is applied to 5 different acquisitions and the results, analysis are represented. These acquisition examples are:

1. Mass transportation of Turkish Armed Forces personnel
2. Meal service for privates
3. ANKA Turkish Unmanned Aerial Vehicle Support Program
4. Turkish Army's advanced Armored Combat Vehicle (ACV) Support Program
5. F-35 Joint Strike Fighter (JSF) Support Program

First two examples were also suggested by Bozkurt and Guducu (2005) in their study for Turkish Navy. ANKA is the first domestically manufactured Unmanned Aerial Vehicle which is planned for mass-production in the near future. Implementing PBL for Turkish Army's advanced ACV is Denizer's (2007) study. And one of the partners of F-35 JSF project is Turkish Air Force. The support program is planned to be PBL.

The tool created at methodology is fulfilled according to corresponding acquisition subject matter experts' and/or program managers' ideas, contributions, and comments. For each application the acquisition is explained briefly and the results of the tool accompanying by expert's ideas and analysis are given. Due to confidentiality reasons; their names, units are not given and some of the data are disguised within the range of evaluation score.

The tool and analysis in this research was created/performed on a personal computer with an Intel(R) Core(TM) i7 CPU Q2670QM @2.20 GHz Processor, 8 GB RAM, Windows 7 Home Premium 64-bit operating system, Microsoft Office Home and Student 2010.

## **1. Mass transportation of Turkish Armed Forces Personnel**

Transportation Unit A is responsible for nearly 7,000 personnel's daily transportation in one of the pretty populated cities in Turkey, which has an area of nearly 2,300 square miles. There are approximately 80 different routes. The unit has three sub-units. Two of them are responsible for 50% of transportation and the other is responsible for other part which is outsourced to a third party. Due to lack of organic capabilities; most of the mass transportation of personnel is done by contracted third parties. In this example Unit A plans to increase contracted transportation service percentage from 50% to 70%. 30 % will remain organic. And the tool will help us to decide whether PBL fits in this acquisition or not.

Three metrics are planned to be used; on time transportation to last stop; timely arrival to each stop and passenger satisfaction regarding the condition of vehicles, driving habits of drivers, etc. These metrics are determined by unit and not negotiated with candidates. According to one of the PMs; to accomplish the mission is more important than cost issues although there are some budget constraints. But they are expecting a similar cost reduction like they experienced when they had gone outsourcing. One of the purposes for outsourcing is warrant qualified drivers, service to hard-to-drive areas which has several blind spots in that region. Till now, contactors in that city have done a pretty good job. There are not any political barriers though there are regulations, constraining terms, general military rules, etc. And also more than one year contracting is prohibited by acquisition regulations. Exceptions are not expected in this case. Organic structure has qualified personnel and tools for performance data collection, besides they have almost 5 years of historical data. But neither of the possible partners including the organization itself is not experienced or trained in PBL. Generally 8 firms are willing to be awarded for this contract. Three of them are big firms in this area. Till now most of the contracts

awarded to two firms. One of the firms is responsible for 60% of the outsourced area and the other for 40%.

The tool was fulfilled by PM; evaluation and results are presented in Appendix C.

Results` summary is presented in figure 11.

According to author's weighted tool score PBL fits for this acquisition by 31.9 %.		General Scores:	
PBL might not be the best acquisition strategy. Business case analysis is advised.			
To have a more successful PBL pay more attention to improve the factors below:			
Reduction in total cost of ownership, life cycle cost; Presence, Determination of metrics, performance		Occurrences` weighted Tool Score	3.1356
outcomes; Improvement in performance; Partnership, strategic alliance; Length of contract;		Author's weighted Tool Score	3.1886
Flexibility; Better Service, Best Value Created, Best Practices ; Successful implementation of PBL,		User's weighted Tool Score	3.6804
PBL experience and training; Innovation; Data availability; Candidates and competition; Properties of		Occurrences` weighted User's Score	2.8108
system; .		Author's weighted User's Score	2.9650
		User's weighted User's Score	3.5287

Figure 11. Results for Mass transportation of Turkish Armed Forces Personnel.

As seen PBL fits in by around 32%. Therefore PBL is not advised since it might not be the best acquisition method. Organization should find a way to improve the factors; reduction in total cost of ownership, life cycle cost; presence, determination of metrics, performance outcomes; improvement in performance; partnership, strategic alliance; length of contract; flexibility; better service, best value created, best practices; successful implementation of PBL, PBL experience and training; innovation; data availability; candidates and competition; properties of system.

In such a constraining environment and lack of long contracts due to regulations; the result is expected. Although some of the authors recommend using PBL in these services, it does not seem to be the best way for procurement. PBL is not just outsourcing, indeed. Although user's weighted score is close, there is a 10.66% positive difference is present. Figure 12 shows the differences at each factor evaluation and also for author weighted tool score and user weighted user score. As seen; subjectivity may cause so much variability in evaluation.



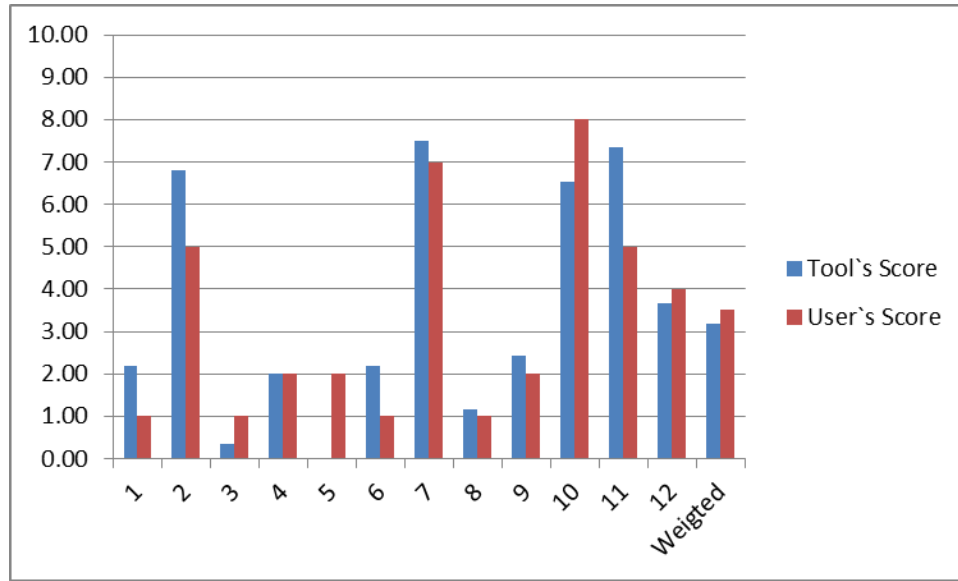


Figure 12. Subjectivity Analysis for Mass transportation of Turkish Armed Forces Personnel.

## 2. Meal Service for Privates

In Turkey military service for 1.5 years is mandatory. All expenses regarding subsistence, quarter, clothes, apparel, etc., are provided by Government. Turkish Quartermaster officers are responsible for these types of acquisitions. There is a trend for third party logistics in meal services. Bozkurt and Guducu (2005) also suggested using PBL in this case.

Unit B is responsible for 3,000 privates' meal service with around 75 personnel. There are totally five kitchens which serves 13 different locations. The meal service consists of 3 meals; breakfast, lunch and dinner. Three meals should include at least 3,500 calories daily. Unit B is planning to have a service contract for a year. Maximum one year contract is available according to regulations. They are expecting a 5% total cost reduction and a better service quality. Some of the facilities will be allowed to be used by contractor. But there are certain strict regulations not only in procedures but also in providing meals, 'what to do's. For a PBL, calories of meals limited to optimum, customer satisfaction, the accordance to technical specifications

document, on time service, sharing benefits in cost reduction, number of staff in service are planned to be used as metrics. There are several firms willing to enter although neither of them is experienced in PBL. But they are doing pretty well job in this business.

Tool is fulfilled according to PM`s knowledge. Evaluation and results are presented at Appendix C. Results` summary is presented in figure 13.

According to author's weighted tool score PBL fits for this acquisition by 22.6 %.	General Scores:	
PBL might not be the best acquisition strategy. Business case analysis is advised.		
To have a more successful PBL pay more attention to improve the factors below:	Occurrences` weighted Tool Score	2.2329
Reduction in total cost of ownership, life cycle cost; Presence, Determination of metrics, performance outcomes; Improvement in performance; Partnership, strategic alliance; Length of contract;	Author's weighted Tool Score	2.2550
Flexibility; Better Service, Best Value Created, Best Practices ; Successful implementation of PBL, PBL experience and training; Innovation; Data availability; Properties of system; .	User's weighted Tool Score	3.1413
	Occurrences` weighted User's Score	2.2366
	Author's weighted User's Score	2.2450
	User's weighted User's Score	2.8841

Figure 13. Results for Meal Service for Privates.

Although the service which will be provided by contractor is better, the constraining of regulations, rules do not give any improvements. Since the organic structure does a pretty well job in some of the metrics, there are not much improvement is expected. Therefore according to the results PBL is not a good option. It fits 22.6%, so close to the lowest level 20%. Although user`s weighted score is close, there is a 27.89% positive difference is present. Figure 14 shows the differences at each factor evaluation and also for author weighted tool score and user weighted user score. As seen; subjectivity may cause so much variability in evaluation.

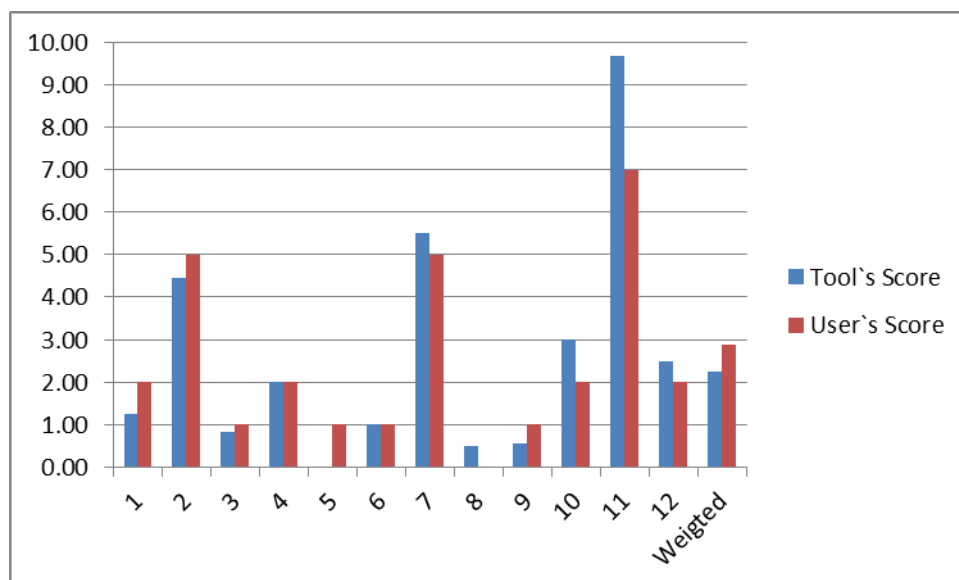


Figure 14. Subjectivity Analysis for Meal Service for Privates.

### 3. ANKA Turkish Unmanned Aerial Vehicle Support Program

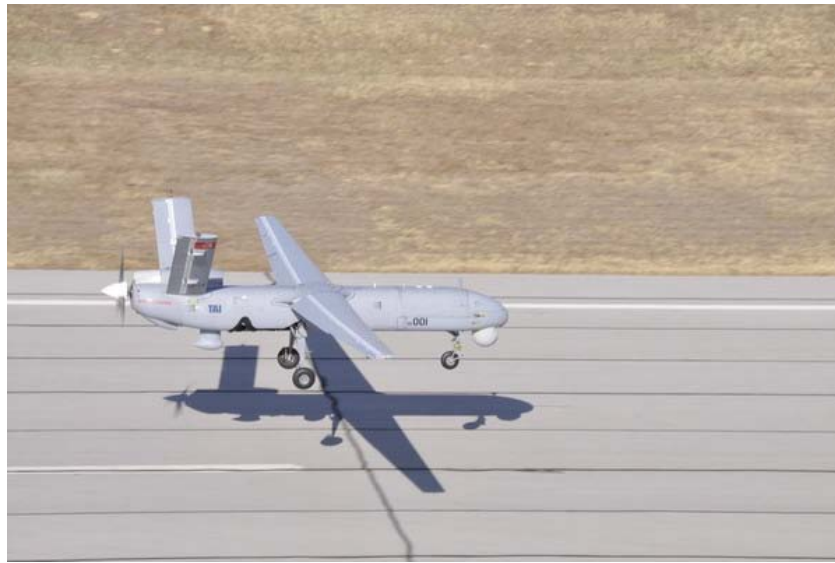


Figure 15. ANKA, Turkish UAV (TAI, 2012).

ANKA is an UAV developed by Turkish Aerospace Industries (TAI), for intelligence, surveillance target acquisition and reconnaissance (TAI, 2011). The name, ANKA comes from a mythical flying creature Phoenix. Technical specifications are listed in table 29.

Table 29. Technical Specification for UAV ANKA (Adopted from TAI, 2011).

Specifications	Unit	Value	Specifications	Unit	Value
Service Ceiling	ft	30000 MSL	Fuselage Length	m	10
Maximum Endurance	hrs	24	Wing Span	m	17
Cruise Speed	kts	110	Wing Area	m <sup>2</sup>	13.6
Engine Power	hp	115 ISA@SL	Wing Aspect Ratio	-	22
Datalink Range	mi	200	Wing Sweep (quarter chord)	°	0
Payload Weight	kg	200	Environmental Conditions: 15 kts side wind, 20 kts head wind; temperature, humidity, rain and icing limits for MIL-HDBK-310		
Fuel Weight	kg	300			
Maximum Take-Off Weight	kg	1600			

The contract for an indigenous Medium Altitude Long Endurance (MALE) Unmanned Aerial Vehicle (UAV) system was signed between Turkish Air Force and TAI on 24 December 2004.

“Within the framework of the program, a total of three prototypes and ground systems will be designed, developed, manufactured and tested by mid-2011 as part of the

prototype development phase. Subsequently in 2012, the serial production phase of Anka-A will be launched and additional 10 systems (meaning 30 air vehicles) will be built for the Turkish Air Force. To attain an indigenous power unit for the Anka, Tusas Engine Industries (TEI) develops a turboprop engine expected to start trials in 2011.” (Wikipedia, TAI Anka, 2012)

After several inspections, tests and developments Defence Industry Executive Committee contracted Turkish Aerospace Industries for the serial production of 10 ANKA vehicles on January 5, 2012.

MICAP ratios and fleet readiness are planned to be metrics. The expectations are similar to Shadow Unmanned Aerial Vehicle PBL program in U.S. There are regulations blocking innovations approaches and flexibility. An exception is planned to be approved from the Turkish Grand National Assembly for this program regarding these regulations. Although this is a new system, Air Force maintenance personnel is skilled, experienced in similar systems. But neither organic nor commercial structures` personnel are experienced in PBL. This PBL program is planned to be at least a 5-years contract and budgeted in 10 year procurement plans. Since the system is domestically designed, manufactured, especially commercial structure may be counted as innovative.

The tool is fulfilled by one of the knowledgeable acquisition officer`s comments in this project. Evaluation and results are presented in Appendix C. Results` summary is presented in

According to author's weighted tool score PBL fits for this acquisition by 61.5 %.		General Scores:	
PBL is advised as an acquisition strategy. Business case analysis is required.			
To have a more successful PBL pay more attention to improve the factors below:		Occurrences` weighted Tool Score	6.0659
Reduction in total cost of ownership, life cycle cost; Presence, Determination of metrics, performance outcomes; Improvement in performance; Partnership, strategic alliance; Length of contract; Flexibility; Better Service, Best Value Created, Best Practices ; Successful implementation of PBL, PBL experience and training; Innovation; Data availability; Up-front, early planning.		Author's weighted Tool Score	6.1462
		User's weighted Tool Score	6.3938
		Occurrences` weighted User's Score	6.2765
		Author's weighted User's Score	6.2800
		User's weighted User's Score	6.3265

Figure 16. Results for ANKA Turkish UAV Support Program.

Since the system is domestically produced, environment is suitable for PBL. The only lack is experience in this case. This program fits by 61.5% and gaining experience will lead to higher percentages. Although user's weighted score is close, there is a 3% positive difference is present. Figure 17 shows the differences at each factor evaluation and also for author weighted tool score and user weighted user score. As seen; subjectivity may cause so much variability in evaluation.

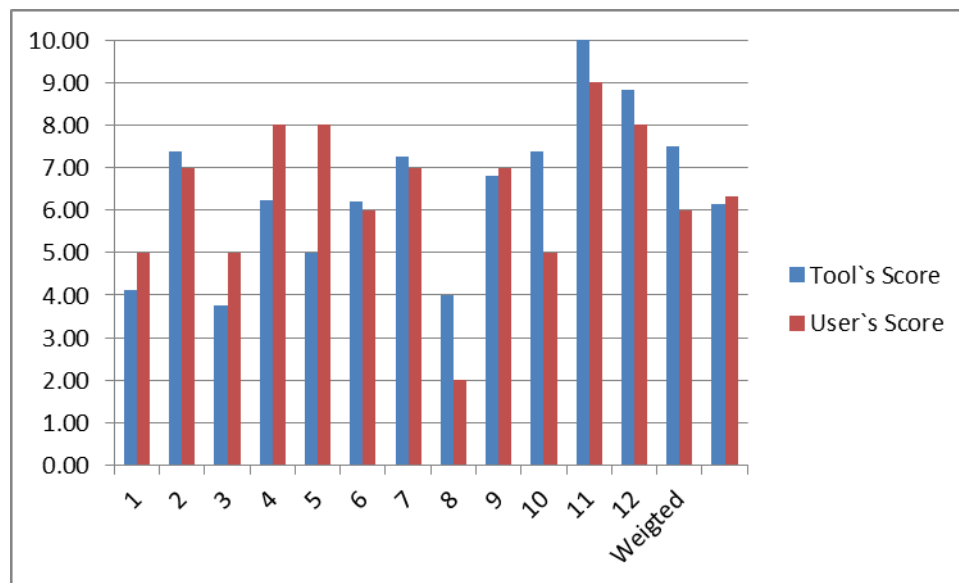


Figure 17. Subjectivity Analysis for ANKA Turkish UAV Support Program.

#### 4. Turkish Army's Advanced Armored Combat Vehicle (ACV) Support Program

ACV platforms are used for support to tanks and armored personnel carriers. It is easy to implement variety of weapons (such as machineguns, antitank weapons, mortar, cannon, etc.) on it. Therefore costs are reduced by multitasking. These are saviors of Land Forces in field. Their speed is around 65 km./h., range is around 490 km., and capacity is 11 personnel. These systems are not only used by Turkish Land Forces but also exported to BAE, Malaysia, Philippines, and Saudi Arabia.



Figure 18. Turkish ACV Platform (SSM, 2012).

Turkish Defense Industry Executive Committee (DIEC) awarded FMS-NUROL consortium twice; once for 1,698 ACV platforms in 1989 completed in 2000, and once for 551 ACV platforms in 2000 completed in 2005.

Although acquisition program followed five main implementation steps (prototype production, test and evaluation, production, acceptance, evaluation and testing, shipment to the warfighters, guarantee period) domestically, and support strategy is total life cycle support management, PBL is not considered at all. Turkish Army Logistics Command is responsible to make them MICAP.

Denizer (2007) suggested to implement PBL strategy to ACV platforms likewise U.S. Army did in Stryker Interim Combat Vehicle (ICV). The tool is used to assess the conformity according to his study and open sources.

Regarding competition, skills and capabilities of contractors:

“Turkey’s industrial sector is able to present and provide competitive logistic capabilities especially in the ground vehicles industry. The utilization of this industrial potential for military sustainment may be beneficial in terms of not only getting better quality service

support, but also adopting better business practices used successfully by the commercial adversaries to the military logistics over a certain period.” Denizer (2007, p.52)

Partnering opportunities is also emphasized in his study. In addition to that he declared organic maintenance capability, training as one of the bests.

In his study he applied the 12 steps for implementation by comparing Stryker ICV and Turkish ACV in details. Although each step is seemed to be applicable to ACVs, he admits that PBL is a new term for Turkish Armed Forces. According to him “since this concept is quite new for Turkish Army logistics, it seems to be beneficial to start with a selective pilot project to improve experience to adapt it into organization and culture.” (Denizer, 2007, p.90)

He expects a similar cost savings as U.S. did in Strykers; \$12/\$20 per mile, 40% reduction. But he also admits that lack of data issues will be experienced likewise Stryker PBL program although Turkish Army is in business for almost 10 years. Top level five metrics are suggested to be used by him as U.S. did in Strykers like availability and reliability metrics.

The tool is fulfilled by one of the knowledgeable acquisition officers in this project.

Evaluation and results are presented in Appendix C. Results` summary is presented in figure 19.

According to author's weighted tool score PBL fits for this acquisition by 59.4 %.		General Scores:	
PBL might be considered as an acquisition strategy. But detailed Business Case Analysis is required.			
To have a more successful PBL pay more attention to improve the factors below:		Occurrences` weighted Tool Score	5.8678
Presence, Determination of metrics, performance outcomes; Improvement in performance;		Author's weighted Tool Score	5.9352
Partnership, strategic alliance; Length of contract; Flexibility; Successful implementation of PBL, PBL		User's weighted Tool Score	6.2763
experience and training; Innovation; Data availability; Properties of system; .			
		Occurrences` weighted User's Score	5.8323
		Author's weighted User's Score	6.2250
		User's weighted User's Score	6.4405

Figure 19. Results for Turkish ACV Support Program.

This is also a domestically produced system. Experience and skilled force is present in service. The only limitation is experience in PBL. Although results show that PBL might be considered as an acquisition strategy by 59.4%, since the next level is 60% this support program will be considered a successful PBL. This time user`s weighted score is a little bit different than author weighted tool score. The reason might be the willing to use PBL as an acquisition method. There is an 8.51% positive difference is present. Figure 20 shows the differences at each factor

evaluation and also for author weighted tool score and user weighted user score. As seen; subjectivity may cause so much variability in evaluation.

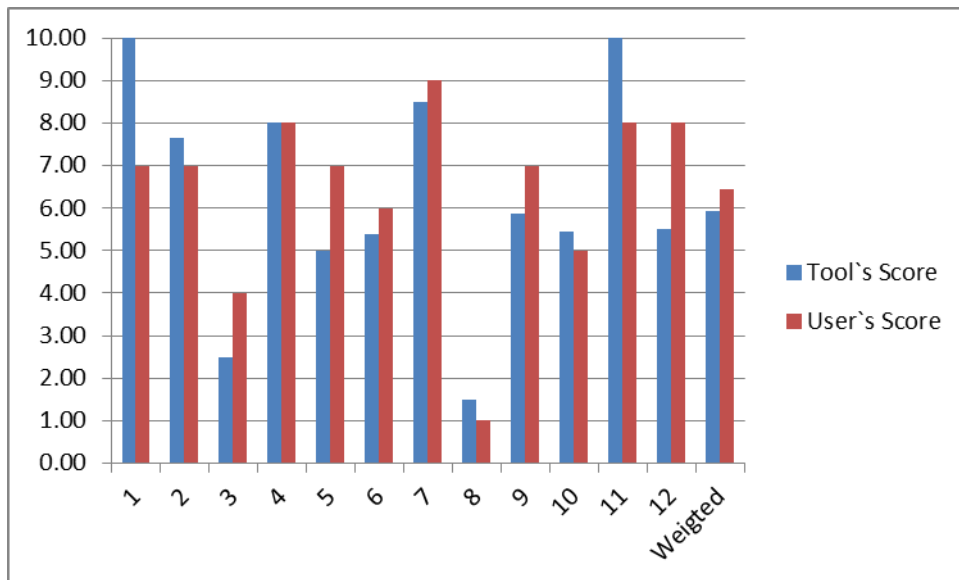


Figure 20. Subjectivity Analysis for Turkish ACV Support Program.

## 5. F-35 Joint Strike Fighter (JSF) Support Program



Figure 21. F-35 Joint Strike Fighter.(JSF, 2012).

F-35 is the next generation strike aircraft weapon systems which bring last technologies to the battle space of the future. JSF program excelled among various tactical aircraft acquisition



programs. But the experience, which was gained from other programs, is precious. This aircraft is planned to be a very reliable weapon system.

“The JSFs advanced airframe, autonomic logistics, avionics, propulsion systems, stealth, and firepower will ensure that the F-35 is the most affordable, lethal, supportable and survivable aircraft ever to be used by so many warfighters across the globe.” (JSF, 2012)  
This is an international program consists of 9 different countries and one of them is

Turkey by nearly 4% stake. U.S. Department of Defense awarded Lockheed Martin for this program in 2001. Lockheed Martin is the F-35 prime contractor, while Northrop Grumman and BAE Systems are partners.

In 2011, 972 flights are flown and 7,823 test points are tallied. This is an achievement beyond plans.

“... flight test program plan calls for the verification of 59,585 test points through developmental test flights by Dec. 31, 2016. Through 2011, the flight test team has accomplished 12,728 test points or 21.4 percent of overall testing requirements.” (JSF, 2012)

This program keeps aircrafts MICAP whenever required. It was designed for optimum sustainability. The platform’s sustainability features include advanced monitoring, maintenance and prognostics, streamlined service operations, autonomic logistics information system, global logistics, key supportability benefits (such as readiness and reliability, force protection and mission fulfillment, cost savings).

The program is a well-known example of up-front planning of PBL. Besides all war game simulations are done depending on PBL support decision. The partners are experienced not only in their job but also in PBL.

The tool is fulfilled according to one of the PMs’s ideas, comments. Although Turkey is willing to be a PBL partner in this program, personnel do not have much experience and knowledge about PBL. But Air Force’s organic maintenance capability is sufficient. As U.S. did

in previous PBL programs MICAP ratios, fleet readiness, cost reduction are planned to be used as metrics. Cost reduction expectations are similar; 20%. It is planned to be at least a 5-years contract and budgeted in 10 year procurement plans. Political and budget issues have been experienced in U.S. regarding JSFs. Since the program is internationally contributed, these kinds of issues may occur in the future, too. Although Turkish acquisition regulations do not allow what PBL requires, there will be exceptions for this program after approval of the Turkish Grand National Assembly.

Evaluation and results are presented in Appendix C. Results` summary is presented in figure 22.

<p>According to author's weighted tool score PBL fits for this acquisition by 70.5 %.</p> <p>PBL is advised as an acquisition strategy. Business case analysis is required.</p> <p>To have a more successful PBL pay more attention to improve the factors below:</p> <p>Reduction in total cost of ownership, life cycle cost; Presence, Determination of metrics, performance outcomes; Improvement in performance; Partnership, strategic alliance; Flexibility; Better Service, Best Value Created, Best Practices ; Successful implementation of PBL, PBL experience and training; Innovation; Data availability; Up-front, early planning.</p>	<b>General Scores:</b>	
	Occurrences` weighted Tool Score	6.9132
	Author's weighted Tool Score	7.0497
	User's weighted Tool Score	7.0347
	Occurrences` weighted User's Score	6.5821
	Author's weighted User's Score	6.6800
	User's weighted User's Score	6.5437

Figure 22. Results for JSF Support Program.

PBL is advised for this program. The only limitation is experience in PBL for Turkey. Other than that this is a PBL environment. It fits 70.5%, but it will be increased day by day by experience in PBL. There is a 7.17% negative difference is present. Figure 23 shows the differences at each factor evaluation and also for author weighted tool score and user weighted user score. As seen; subjectivity may cause so much variability in evaluation.

### Validation and Verification of the Tool

The results show that the tool does the job, it is pretended to do. Therefore it can be stated that the right model/tool is built. All of the results are expected in each situation and each answer. After the evaluation, the comments and suggestions regarding the tool are asked to users, too. Although the comments are mostly positive, the negative comments are taken into account

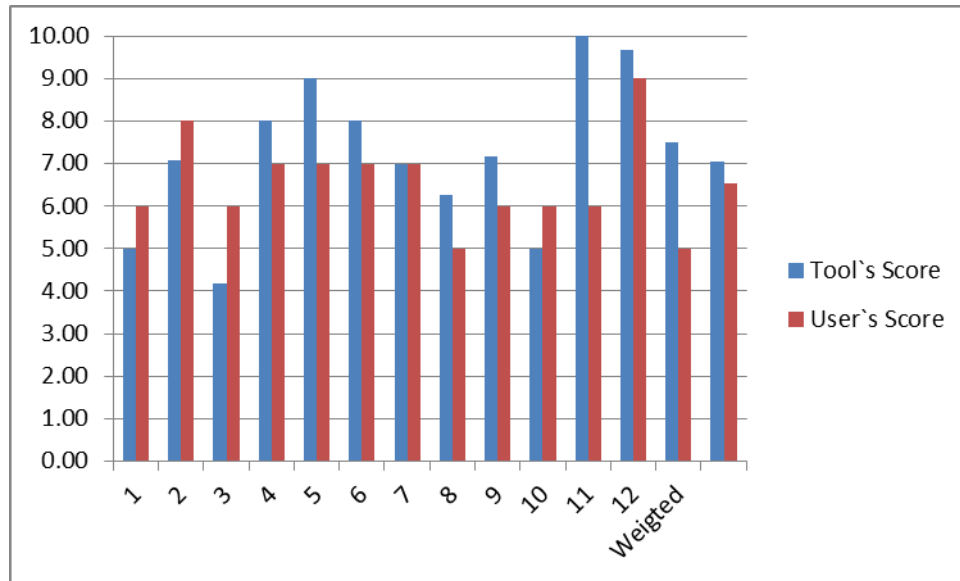


Figure 23. Subjectivity Analysis for JSF Support Program.

and the tool is improved, upgraded according to their ideas. Therefore a more user friendly tool is built. Positive ideas also supported that the tool works. In addition to validation; each result according to the answer given, is double checked in every example and it is found that the model/tool is right. Every answer is converted to the quantitative value as it should. The model is verified.

## **V. Results**

This chapter summarizes the research, answers the research and investigative questions, discuss the conclusions, limitations and possible future work.

### **Summary of the Research and Answers to Questions**

After a detailed literature review thirteen factors have been found that affects the selection of PBL as an acquisition method. These factors are:

1. Reduction in total cost of ownership, life cycle cost
2. Presence, Determination of metrics, performance outcomes
3. Improvement in performance
4. Partnership, strategic alliance
5. Length of contract
6. Flexibility
7. Better Service, Best Value Created, Best Practices
8. Successful implementation of PBL, PBL experience and training
9. Innovation
10. Data availability
11. Candidates and competition
12. Properties of system
13. Up-front, early planning

This is the answer for the research question: ‘What factors determine the appropriateness of the selection of PBL as a strategy for a specific acquisition?’

Four questions are asked as investigative questions. Answers and the processes for research are explained below.

What is the current policy to use PBL? Regarding this policy does every acquisition fit in PBL?

DoD's policy is applying PBL whenever and wherever applicable. It is not only suggested, but also mandated by DoD policies and acquisition regulations. Though, applicability is not detailed much. This research has a contribution from this point of view. PBL does not fit in every acquisition. There are some cases where PBL is not applicable, where it is not advised and where it is not the best method.

Has DOD ever experienced any failure/pitfall due to selecting PBL as their strategy?

There are many best practices, awarded applications of PBL mentioned in the literature. In addition to those good examples, there are various lessons learned. But literature does not mention any failure regarding selecting PBL as their strategy. PBL is mainly used in war goods and achieved a success somehow; extremely or a little.

How do the criteria effect acquisition regarding PBL?

As mentioned above there are 13 factors determined that affects the success of PBL. Each factor has an effect in its way. Till now, PBL has achieved an average of 25-30% total cost reduction. In addition a 10% total cost reduction is also categorized as a success. Therefore at least a reduction should be expected, but much is better.

Well determination of metrics is one of the most important factors. The metrics should be understandable, clear, specific, traceable, measurable, and fair to all partners. The better you define metrics, the more success you achieve. It is suggested to use top level metrics; operational availability, operational reliability, cost per unit usage, logistics footprint and logistics response time. It is also advised to use 5 or less metrics not to be complex in performance metrics` evaluations.

Performance improvement is counted as one of the purposes of PBL. Experiences show that 35% performance improvement is achieved for each metrics in average. But more than 10% is also counted as a success. Therefore at least an improvement should be expected, but much is better.

PBL is a partnership, an alliance. PBL requires more sophisticated, complex relationships than traditional methods. To build and manage relationships is so important. At least long term relationships including trust between partners, information, risk and benefit sharing is required. The better you manage and build partnering relationships, the more success you achieve.

For a win-win solution as PBL offers, a sufficient length of contract is an obligation. Buyer's goal is to reach the desired outcomes, whereas contractor tries to get profit via return on investment. Although there are few examples of successful 3 year PBL contracts, at least 5 years contract is recommended.

PBL's purpose is buying outcomes, not dictating what to do. In PBL environment it is advised to tell the contractor what is needed, not how to achieve it. As long as the buyer gets what s/he wants, contractor has the flexibility how the support is provided. Maximum flexibility should be provided for contractor's actions. Buyer should let the contractor to do what s/he does best. PBL should allow partners to use their knowledge, innovation, experience. As flexible as it can be will give better results.

PBL is integration of partners to find the way to reach best practice. It is the combination of all organic and commercial abilities. Managing life cycle systems, directing supply chain management, and trying to meet the operational sustainment metrics abilities accompanying with skills, knowledge and experience regarding the system are important. It is also important to find

the best mix of qualified personnel. Cooperation of organic and commercial elements should be aligned. The more qualified service, the better job is done.

PBL is a new culture, a transition from traditional approaches. Implementation is the most important process. The most effective way for an implementation is making use of others' experience. Awareness, training, education are requirements to be better. Subject matter experts support a continuous education, training for PBL. The more you learn the better job you do.

Innovation, creativity is a fundamental element of PBL, especially regarding performance metrics improvement. Innovation is another skill, that contractor should have in addition to his/her knowledge and experience. S/he should use the given freedom for innovative approach to have better results regarding metrics. All subject matter experts agree that innovation is a success key booster in PBL. The more innovative approaches, the more success you will achieve.

Three types of data are required for PBL. This acquisition method is buying performance according to in advance-set performance values. To set those, historical data is required. For cost estimations, cost data is required. And when it comes to payments; recent performance data is required for metrics evaluations. The purpose is to have the most accurate, sufficient data.

Competition is another requirement in PBL as it is for the other methods. Buyer should find contractors who are willing to accept the PBL strategy. It is experienced that candidates are not so excited about PBL. A more competitive environment is desired. And in case of having just one candidate for the acquisition, OEM or prime vendor can achieve the performance requirements, although there is not any competition. But also it is hard to manage many suppliers. Therefore system level PBL under an umbrella with a PSI is better for success. Experiences show that few suppliers, such as 1 to 4, are good for PBL.

PBL is mostly good for new, strategically important, high-tech, complex, long life, capital intensive systems. And PBL is not good at all either for legacy systems at their end of lives, or for highly reliable systems. But PBL is recommended for capital intensive systems. If insourcing required lots of investments, PBL would rather be preferred.

The last factor; up-front planning and early PBL implementation is only applicable to new systems. Early decision of PBL, will booster success of the sustainment program. Early implementation includes well implementation of sustainment processes regarding design, sustainment in the field, partnership and responsibilities. The earlier you get ready for PBL, the more success you will achieve.

According to this information, a tool is built to assess the conformity of PBL as an acquisition method. The tool assumes a linear relationship between factors and success of PBL. Qualitative measures, gathered from literature and user`s answers, are converted to qualitative measures in to have a scale and a more precise result. Results show that not all acquisitions are fit in PBL. User can see these results in results spreadsheet by numbers, percentage quantitatively or by comments qualitatively.

Is this assessment tool usable in every service-acquisition decision?

In section 4, applications of different types of procurement are presented. All of the applications of the tool are seem to be successful. Therefore it can be stated that the tool is applicable in almost every service-acquisition decision. In addition to that this tool might be applicable to any stage of procurement decision. User may apply it at the beginning of decision process to assess the conformity of PBL as an acquisition method and/or it is applicable after a detailed business case analysis with more accurate values, answers and/or it is even applicable after the procurement with results to see if PBL has achieved a real success.



## **Conclusion**

PBL is not applicable to every acquisition. But it is possible to determine the success of PBL by looking at the factors of selecting an acquisition method. This research lists these factors and explains how they affect the success. The tool, built according to this information, is a handy tool which will help detailed, time consuming business case analysis. It will help in decision making process and save time which is precious for decision makers. Not only this research but also the tool, itself is a contribution.

## **Limitations**

The main limitation is the language, English; both for the qualitative intensive thesis and creating questions to capture effects for the tool, since it is not the author's mother tongue.

Interrelationships between factors were not taken into account, since the regression analysis cannot be applicable to find a regression model due to lack of values for dependent factor, success. Although binary values may be applicable for success and failure, logistics regression is not applicable either due to lack of failed PBL examples. Neither regression models nor interactions terms were used, although they may improve the model.

Although a sufficient literature review is done, some questions in the tool may not be adequate to evaluate that factor in some special cases. That is the reason tool suggests detailed business case analysis even if results are high enough. In addition to that, some questions in the tool may be beyond the knowledge of user. For these special cases the tool may lack to assess the factor. But the tool is a spreadsheet and upgradeable with more questions to prevent this challenge.

Although a user friendly tool is tried to be built, and an instructions is implemented, half-an-hour training, education regarding the tool, the goods/service in subject and/or PBL might be required.

The tool evaluation should be repeated for every possible candidate. Tool is not capable of evaluating each of them in a spreadsheet.

### **Future Work Suggestions**

Each factor by itself is a possible research topic. Like Gardner (2008) did in contract's length, each factor might be examined in details. And according to these studies the tool might be improved with many more questions to fill the gaps explained in limitations.

Another research might be done in selecting the best acquisition method by building a tool to assess every factor affecting all acquisition methods and compares them.

## Appendix A: Sample Literature

	1. Reduction in total cost of ownership, life cycle cost	2. Presence, Determination of metrics, performance outcomes	3. Improvement in performance	4. Partnership, strategic alliance	5. Length of contract	6. Flexibility	7. Better Service, Best Value Created, Best Practices	8. Successful implementation of PBL, PBL experience and training	9. Innovation	10. Data availability	11. Candidates and competition	12. Properties of system	13. Up-front, early planning
Anonymous (2005)	X					X	X			X			X
BAE (2010)	X		X	X			X		X				
Baldwin, Ausink and Nicosia (2005)	X	X				X	X			X	X		
Barnes and Johnson (2010)	X					X			X				
Bellis (2001)	X		X			X	X		X				
Berkowitz et al. (2003)	X	X	X	X			X	X	X	X	X	X	X
Berkowitz, et al. (2004)	X	X	X	X	X	X	X	X	X				
Blumberg (2006a)	X	X	X		X	X	X	X					
Blumberg (2006b)	X	X	X	X	X	X	X	X		X			X
Blumberg (2007a)	X	X	X	X	X	X	X	X		X			X
Blumberg (2007b)	X	X	X	X	X	X		X					
Boehk (2003)	X		X						X				
Bozkurt and Guducu (2005)	X	X	X	X	X		X		X	X	X	X	
Brown and Cothran (2005)								X					
Burkett (2008)		X		X				X		X			
Buyukgural (2009)	X	X		X	X				X			X	
Canada (2006)	X	X	X	X	X		X	X		X			
Cebeci (2009)	X	X	X	X	X	X	X	X	X				
Cohen and Netessine (2007)	X			X						X	X	X	
Cothran (2008)		X					X	X					X
Cothran (n.d)		X			X	X	X				X		X
Dean (2002)													
Devries (2004)		X		X		X		X					X
Dibenedetto (2007)	X	X	X	X	X		X						
DoD Designing and Assessing Supportabil	X	X	X	X			X		X	X			X
DoDD 5000.01 (2003)	X	X	X	X		X	X		X		X		
DoDD 5000.02 (2002)	X		X	X		X	X	X	X	X	X		X
Doerr, Lewis and Eaton (2005)	X				X	X	X			X	X	X	
Fogarty (2006)	X												
Fowler (2009)	X	X	X	X		X	X						
Fowler (2010)	X	X	X	X			X			X			
Gansler, et al. (2011)	X	X	X	X	X	X	X	X	X	X	X		
GAO Report (2008a)				X									
GAO Report (2008b)	X	X	X		X	X			X	X			
Gardner (2008)	X			X			X			X	X		
Geary (2006)	X		X	X		X		X				X	
Geary and Vitasek (2005)	X	X	X										
Geary, et al. (2010)	X	X	X	X	X	X	X	X	X				
Gillie (2006)	X											X	
Goure (2009)	X	X	X	X			X		X				
Goure (2010)	X	X	X	X	X	X		X	X		X	X	
Goure (2011a)							X						
Goure (2011b)	X		X	X			X					X	
Harada (2010)		X			X			X		X	X	X	
Hedden (2005)	X	X	X		X				X	X			
Hedden (2007)	X	X								X			X
Heller (2001)	X	X											
Heron (2010)	X	X		X								X	X
Kelman (2007)									X				
Kim, Cohen and Netessine (2006)	X	X	X		X	X						X	
Kobren (2009)	X	X		X	X			X			X	X	
Kobren (2010)	X	X	X	X	X	X		X			X	X	

## Appendix A: Sample Literature (Cont.)

	1. Reduction in total cost of ownership, life cycle cost	2. Presence, Determination of metrics, performance outcomes	3. Improvement in performance	4. Partnership, strategic alliance	5. Length of contract	6. Flexibility	7. Better Service, Best Value Created, Best Practices	8. Successful implementation of PBL, PBL experience and training	9. Innovation	10. Data availability	11. Candidates and competition	12. Properties of system	13. Up-front, early planning
Kratz (2001)	X	X	X		X	X	X	X	X		X	X	
Kratz and Buckingham (2010a)	X	X	X	X	X			X	X	X	X	X	
Kratz and Buckingham (2010b)	X	X	X	X	X		X		X	X	X		
Lessons Learned (2004)		X			X	X		X		X			
Mahadevia, Engel and Fowler (2006)	X		X	X									
Marietta (2008)			X	X				X	X				
Maylett and Vitasek (2008)				X				X					
Memorandum: PBSA (2000)		X	X			X		X	X		X		
Miller (2008)	X		X	X									
Mirzahosseini and Piplani (2011)		X	X		X	X							X
Mitchell (2008)		X											
Newsome (2008)	X	X	X	X	X	X	X			X	X		
Nicosia and Moore (2006)	X		X	X	X		X	X		X	X		
Ott (2008)		X	X	X									
Owings (2010)	X	X	X	X	X	X							
PBL Guide (2005)	X	X	X	X	X	X	X	X	X	X	X		
Pettingill, et al. (2004)	X	X	X		X			X		X	X		X
Slinkard and Poleskey (2006)				X	X				X		X		
Sols, Nowick, and Verma (2007)	X	X	X		X	X	X		X	X		X	X
Spring (2010)	X	X	X	X		X	X						
Trovato (2004)	X		X	X		X	X				X		X
Venema (2007)		X				X		X					
Vitasek (2007)		X	X		X			X	X				
Vitasek and Geary (2007)	X	X	X	X	X	X		X					
Vitasek and Geary (2008)	X	X	X	X	X	X	X	X					
Vitasek, Cothran and Rutner(2006a)	X	X	X		X	X	X						
Vitasek, Cothran and Rutner(2007)	X	X	X	X	X	X							X
Vitasek, et al. (2006b)	X	X	X	X	X	X	X						
Wuchenich (2008)		X		X	X			X					
<b>TOTAL</b>	<b>60</b>	<b>56</b>	<b>52</b>	<b>49</b>	<b>41</b>	<b>39</b>	<b>38</b>	<b>34</b>	<b>28</b>	<b>27</b>	<b>24</b>	<b>17</b>	<b>16</b>

## Appendix B: The Tool

### Evaluation Sheet

INSTRUCTIONS			RESET	GO TO RESULTS		
<b>FACTOR #1: Reduction in total cost of ownership, life cycle cost</b>						
1	What is the % of reduction expectation in total cost?	SELECT	1	Overall	How much total cost reduction is expected?	SELECT
	What is the % of reduction expectation in contract cost?	SELECT		How important is 'total cost reduction' in selecting PBL as an acquisition method?	SELECT	
	What is the % of reduction expectation in human resources requirement?	SELECT				
	What is the % of reduction expectation in inventory cost?	SELECT				
<b>FACTOR #2: Presence, Determination of metrics, performance outcomes</b>						
2	How accurately are the requirements of goods/service defined?	SELECT	2	Overall	How well are the metrics determined regarding requirements?	SELECT
	How well are the metrics aligned to organization's goals?	SELECT			How important is 'well determination of metrics' in selecting PBL as an acquisition method?	SELECT
	How clear, understandable, solid, specific are the metrics?	SELECT		<div>↑</div> <div>TOP</div>		
	How realistic, sound are the metrics?	SELECT				
	How traceable are the metrics?	SELECT				
	How measurable are the metrics?	SELECT				
	Are the metrics negotiated with candidates?	SELECT				
	How fair are the metrics for all partners?	SELECT				
	Are metrics expressed in any of those, below?	SELECT				
	*Operational availability_Readiness					
	*Operational reliability					
	*Cost per unit usage_Affordability					
	*Logistics footprint					
	*Logistics response time_Cycle time					
Is a target value set for each metrics?	SELECT					
How many metrics are planned to use in contract?	SELECT					
<b>FACTOR #3: Improvement in performance</b>						
3	What is the improvement expectation in % for the 1st metrics?	SELECT	3	Overall	How much performance improvement is expected?	SELECT
	What is the improvement expectation in % for the 2nd metrics?	SELECT			How important is 'performance improvement' in selecting PBL as an acquisition method?	SELECT
	What is the improvement expectation in % for the 3rd metrics?	SELECT				
	What is the improvement expectation in % for the 4th metrics?	SELECT				
	What is the improvement expectation in % for the 5th metrics?	SELECT				
	What is the average improvement expectation in % for other metrics?	SELECT				
<b>FACTOR #4: Partnership, strategic alliance</b>						
4	What type of relationship is expected to be built with provider?	SELECT	4	Overall	How well relationships is expected to be built, managed?	SELECT
	How much integration is expected to be built with provider?	SELECT			How important is 'relationship between partners' in selecting PBL as an acquisition method?	SELECT
	How trustful are the partners to each other?	SELECT				
	How much information is planned to be shared with partners?	SELECT				
	How much of physical network is planned to be shared among partners?	SELECT				
	How much risk will be shared among partners?	SELECT				
	How much of benefits will be shared among partners?	SELECT				
	How well the relationships are managed?	SELECT				
	How supportive is the management to culture change?	SELECT				
	How acceptable is this culture change among employees?	SELECT				
<b>FACTOR #5: Length of contract</b>						
5	What is the contract's planned length in years?	SELECT	5	Overall	How sufficient is the contract's length?	SELECT
	How sufficient is the contract's length for return on investment allowance?	SELECT			How important is 'the contract's length' in selecting PBL as an acquisition method?	SELECT
	How sufficient is the contract's length for providing cash flow continuity to provider?	SELECT				
	How sufficient is the contract's length to accomplish a certain performance level of the desired outcomes?	SELECT				
<b>FACTOR #6: Flexibility</b>						
6	How flexible are the acquisition plan and the terms for provider's actions?	SELECT	6	Overall	How flexible is the acquisition plan for provider's actions?	SELECT
	How much freedom is provided for contractor's actions?	SELECT			How important is 'flexibility' in selecting PBL as an acquisition method?	SELECT
	How much decentralized is the authority?	SELECT				
	How much decentralized are the responsibilities?	SELECT				
	How constraining are the acquisition plan and the terms with specifications, 'what' and 'how to do's?	SELECT				
	How constraining are financial, political, statutory barriers?	SELECT				
<b>FACTOR #7: Better Service, Best Value Created, Best Practices</b>						
7	How well will the expected service quality be provided by organic structure in this partnership?	SELECT	7	Overall	How well is the expected service quality provided by this partnership?	SELECT
	How well will the expected service quality bw provided by commercial structure in this partnership?	SELECT			How important is 'the expected service quality' in selecting PBL as an acquisition method?	SELECT
	How capable is the organic structure to manage life cycle of system?	SELECT				
	How qualified is the organic structure for directing supply chain?	SELECT				
	How knowledgeable is the organic structure about system?	SELECT				
	How experienced is the organic structure about system?	SELECT				
	How skilled is the organic manpower regarding job to be done?	SELECT				
	How skilled is the acquisition personnel regarding job to be done?	SELECT				
	How capable is the commercial structure to manage life cycle of system?	SELECT				
	How qualified is the commercial structure for directing supply chain?	SELECT				
	How knowledgeable is the commercial structure about system?	SELECT				
	How experienced is the commercial structure about system?	SELECT				
	How skilled is the commercial manpower regarding job to be done?	SELECT				
	How well is the work allocation done between partners according to best practices?	SELECT				

## Appendix B: The Tool (Cont.)

FACTOR #8: Successful implementation of PBL, PBL experience and training		
8	How experienced is the 1st partner (organic) in PBL?	SELECT
	How experienced is the 2nd (commercial) partner in PBL?	SELECT
	How experienced is the 3rd (commercial) partner in PBL?	SELECT
	How experienced are the other commercial partners in PBL as an average?	SELECT
	How much importance is given to educational programs/training for PBL in partnership?	SELECT
	How trained/knowledgeable is the acquisition personnel about PBL?	SELECT
How committed is the managements for the culture change?		SELECT

FACTOR #9: Innovation			
9	How constraining are the terms blocking innovational approaches?	SELECT	
	How incentivizing are the terms encouraging innovational approaches?	SELECT	
	How much freedom is present to encourage innovational approaches?	SELECT	
	People: How capable are the employees regarding well-known record of generating innovative ideas in this partnership?		SELECT
	People: How important is screening innovation skills in hiring process in this partnership?		SELECT
	People: How important will innovation be as a factor at employees' performance evaluations in this partnership?		SELECT
	Process: How frequently will brainstorming and generating new ideas take place in this partnership?		SELECT
	Process: How important will 'challenging the status quo/conventional ways' be in this partnership?		SELECT
	Process: How interactive will this partnership be for seeking opportunities with customers, competitors, suppliers, etc.?		SELECT
	Process: How spreaded will 'the networking through outside of this partnership' be for new ideas?		SELECT
	Process: How supportive will this partnership be for adopting pilot programs or experiments?		SELECT
	Philosophies: How encouraging will this partnership be to employees to offer creative ideas?		SELECT
	Philosophies: How supportive will this partnership be to risk taking for new ideas?		SELECT

FACTOR #10: Data availability			
10	How adequate is historical data?	SELECT	
	How accurate is historical data?	SELECT	
	How adequate is cost data?	SELECT	
	How accurate is cost data?	SELECT	
	How adequate will the expected recent data be for metrics' evaluation?	SELECT	
	How accurate will the expected recent data be for metrics' evaluation?	SELECT	
	How many years of performance data is in hand?	SELECT	
	How attainable will the expected recent data/values of metrics be?	SELECT	
	How timely is the data management as a level of real time?	SELECT	
	How adequate are the data collection tools?	SELECT	
	How sufficient is the market for cost estimation?		SELECT

FACTOR #11: Candidates and competition		
11	How constraining are the terms blocking competition?	SELECT
	Are alternative systems considered to meet requirements?	SELECT
	Are qualified international sources permitted to enter?	SELECT
	How sufficient is 'the number of candidates' willing to enter PBL partnership?	SELECT
	In case of sole candidate; is the candidate OEM/Prime Vendor or other?	SELECT
	How many partners are present in PBL including buyer?	SELECT

FACTOR #12: Properties of system		
12	Is contract's subject a new goods/service?	SELECT
	How critical is the goods/service regarding strategic importance?	SELECT
	How technologically advanced are the requirements regarding the goods/service?	SELECT
	How complex is the goods/service?	SELECT
	What is the percentage of expected life left on goods/service?	SELECT
	How reliable is the goods/service?	SELECT
	How much investment is required for insourcing?	SELECT

FACTOR #13: Up-front, early planning		
13	Is 'PBL decision' given early in acquisition of system?	SELECT
	Is 'sustainment of the system as it is being designed' well-planned up-front?	SELECT
	Is 'service of the system serviced in the field' well-planned up-front?	SELECT
	Is 'partnering of industry and service branch support personnel in sustaining that asset' well-planned up-front?	SELECT
	Is 'determination of the multiple responsibilities' well-planned up-front?	SELECT

FACTOR #8: Successful implementation of PBL, PBL experience and training			
8	Overall	How experienced is this partnership in PBL?	SELECT
		How important is 'experience in PBL' in selecting PBL as an acquisition method?	SELECT

FACTOR #9: Innovation			
9	Overall	How innovative is this partnership?	SELECT
		How important is 'innovation' in selecting PBL as an acquisition method?	SELECT

FACTOR #10: Data availability			
10	Overall	How sufficient are the available data and data collection?	SELECT
		How important is 'the data availability' in selecting PBL as an acquisition method?	SELECT

FACTOR #11: Candidates and competition			
11	Overall	How sufficient is the competition?	SELECT
		How important is 'the competition' in selecting PBL as an acquisition method?	SELECT

FACTOR #12: Properties of system			
12	Overall	How important/critical is the system?	SELECT
		How important is 'the system's criticality' in selecting PBL as an acquisition method?	SELECT

FACTOR #13: Up-front, early planning			
13	Overall	How well is the up-front, early planning done?	SELECT
		How important is 'up-front, early planning' in selecting PBL as an acquisition method?	SELECT

INSTRUCTIONS

RESET

GO TO RESULTS

## Appendix B: The Tool (Cont.)

### Results Sheet

[GO TO EVALUATION](#)

#VALUE! Check Evaluation Form!				General Scores:			
				Occurrences' weighted Tool Score	SELECT		
				Author's weighted Tool Score	SELECT		
				User's weighted Tool Score	SELECT		
				Occurrences' weighted User's Score	SELECT		
				Author's weighted User's Score	SELECT		
				User's weighted User's Score	SELECT		

<b>FACTOR #1: Reduction in total cost of ownership, life cycle cost</b>								
<b>1</b>	Tool Evaluation	SELECT #1	Occurrences' weight	SELECT #12.1	Occurrences' weighted Tool Score	#VALUE!		
	User's Score	SELECT	Author's weight	SELECT #12.1	Author's weighted Tool Score	#VALUE!		
			User's weight	#VALUE!	User's weighted Tool Score	#VALUE!		
					Occurrences' weighted User's Score	#VALUE!		
					Author's weighted User's Score	#VALUE!		
				User's weighted User's Score	#VALUE!			

<b>FACTOR #2: Presence, Determination of metrics, performance outcomes</b>								
<b>2</b>	Tool Evaluation	SELECT #2	Occurrences' weight	SELECT #12.1	Occurrences' weighted Tool Score	#VALUE!		
	User's Score	SELECT	Author's weight	SELECT #12.1	Author's weighted Tool Score	#VALUE!		
			User's weight	#VALUE!	User's weighted Tool Score	#VALUE!		
					Occurrences' weighted User's Score	#VALUE!		
					Author's weighted User's Score	#VALUE!		
				User's weighted User's Score	#VALUE!			

<b>FACTOR #3: Improvement in performance</b>								
<b>3</b>	Tool Evaluation	SELECT #3	Occurrences' weight	SELECT #12.1	Occurrences' weighted Tool Score	#VALUE!		
	User's Score	SELECT	Author's weight	SELECT #12.1	Author's weighted Tool Score	#VALUE!		
			User's weight	#VALUE!	User's weighted Tool Score	#VALUE!		
					Occurrences' weighted User's Score	#VALUE!		
					Author's weighted User's Score	#VALUE!		
				User's weighted User's Score	#VALUE!			

<b>FACTOR #4: Partnership, strategic alliance</b>								
<b>4</b>	Tool Evaluation	SELECT #4	Occurrences' weight	SELECT #12.1	Occurrences' weighted Tool Score	#VALUE!		
	User's Score	SELECT	Author's weight	SELECT #12.1	Author's weighted Tool Score	#VALUE!		
			User's weight	#VALUE!	User's weighted Tool Score	#VALUE!		
					Occurrences' weighted User's Score	#VALUE!		
					Author's weighted User's Score	#VALUE!		
				User's weighted User's Score	#VALUE!			

<b>FACTOR #5: Length of contract</b>								
<b>5</b>	Tool Evaluation	SELECT #5	Occurrences' weight	SELECT #12.1	Occurrences' weighted Tool Score	#VALUE!		
	User's Score	SELECT	Author's weight	SELECT #12.1	Author's weighted Tool Score	#VALUE!		
			User's weight	#VALUE!	User's weighted Tool Score	#VALUE!		
					Occurrences' weighted User's Score	#VALUE!		
					Author's weighted User's Score	#VALUE!		
				User's weighted User's Score	#VALUE!			

<b>FACTOR #6: Flexibility</b>								
<b>6</b>	Tool Evaluation	SELECT #6	Occurrences' weight	SELECT #12.1	Occurrences' weighted Tool Score	#VALUE!		
	User's Score	SELECT	Author's weight	SELECT #12.1	Author's weighted Tool Score	#VALUE!		
			User's weight	#VALUE!	User's weighted Tool Score	#VALUE!		
					Occurrences' weighted User's Score	#VALUE!		
					Author's weighted User's Score	#VALUE!		
				User's weighted User's Score	#VALUE!			

<b>FACTOR #7: Better Service, Best Value Created, Best Practices</b>								
<b>7</b>	Tool Evaluation	SELECT #7	Occurrences' weight	SELECT #12.1	Occurrences' weighted Tool Score	#VALUE!		
	User's Score	SELECT	Author's weight	SELECT #12.1	Author's weighted Tool Score	#VALUE!		
			User's weight	#VALUE!	User's weighted Tool Score	#VALUE!		
					Occurrences' weighted User's Score	#VALUE!		
					Author's weighted User's Score	#VALUE!		
				User's weighted User's Score	#VALUE!			

## Appendix B: The Tool (Cont.)

<b>8</b>	FACTOR #8: Successful implementation of PBL, PBL experience and training		Occurrences' weight	SELECT #12.1	Occurrences' weighted Tool Score	#VALUE!	<b>TOP</b>
	Tool Evaluation	SELECT #8	Author's weight	SELECT #12.1	Author's weighted Tool Score	#VALUE!	
	User's Score	SELECT	User's weight	#VALUE!	User's weighted Tool Score	#VALUE!	
					Occurrences' weighted User's Score	#VALUE!	
					Author's weighted User's Score	#VALUE!	
<b>9</b>	FACTOR #9: Innovation		Occurrences' weight	SELECT #12.1	Occurrences' weighted Tool Score	#VALUE!	<b>TOP</b>
	Tool Evaluation	SELECT #9	Author's weight	SELECT #12.1	Author's weighted Tool Score	#VALUE!	
	User's Score	SELECT	User's weight	#VALUE!	User's weighted Tool Score	#VALUE!	
					Occurrences' weighted User's Score	#VALUE!	
					Author's weighted User's Score	#VALUE!	
<b>10</b>	FACTOR #10: Data availability		Occurrences' weight	SELECT #12.1	Occurrences' weighted Tool Score	#VALUE!	<b>TOP</b>
	Tool Evaluation	SELECT #10	Author's weight	SELECT #12.1	Author's weighted Tool Score	#VALUE!	
	User's Score	SELECT	User's weight	#VALUE!	User's weighted Tool Score	#VALUE!	
					Occurrences' weighted User's Score	#VALUE!	
					Author's weighted User's Score	#VALUE!	
<b>11</b>	FACTOR #11: Candidates and competition		Occurrences' weight	SELECT #12.1	Occurrences' weighted Tool Score	#VALUE!	<b>TOP</b>
	Tool Evaluation	SELECT #11	Author's weight	SELECT #12.1	Author's weighted Tool Score	#VALUE!	
	User's Score	SELECT	User's weight	#VALUE!	User's weighted Tool Score	#VALUE!	
					Occurrences' weighted User's Score	#VALUE!	
					Author's weighted User's Score	#VALUE!	
<b>12</b>	FACTOR #12: Properties of system		Occurrences' weight	SELECT #12.1	Occurrences' weighted Tool Score	#VALUE!	<b>TOP</b>
	Tool Evaluation	SELECT #12	Author's weight	SELECT #12.1	Author's weighted Tool Score	#VALUE!	
	User's Score	SELECT	User's weight	#VALUE!	User's weighted Tool Score	#VALUE!	
					Occurrences' weighted User's Score	#VALUE!	
					Author's weighted User's Score	#VALUE!	
<b>13</b>	FACTOR #13: Up-front, early planning		Occurrences' weight	SELECT #12.1	Occurrences' weighted Tool Score	#VALUE!	<b>TOP</b>
	Tool Evaluation	0.0000	Author's weight	SELECT #12.1	Author's weighted Tool Score	#VALUE!	
	User's Score	SELECT	User's weight	SELECT #12.1	User's weighted Tool Score	#VALUE!	
					Occurrences' weighted User's Score	0.0000	
					Author's weighted User's Score	0.0000	
				User's weighted User's Score	0.0000		

## Instructions Sheet

Please answer all the questions colored in orange according to your knowledge.

Answers will be selected from drop down lists.

You do not have to answer the questions which are drawn striketrough.

You can select "N/A" (Not Applicable) option if you do not have any idea or the cases of N/A in some questions.

There are 0 to 10, %, Yes/No answers. All of them are in drop-down lists. 0 means lowest, 10 means highest level.

In case of misselection, non-selection the Result sheet-general score will give "#VALUE!", "#REF!" failure or "SELECT" "Check Evaluation Form" warnings.

You can check each factors' score below general results to see which factor evaluation is a failure.

Some questions should be applied to all candidates. Repeat evaluation for each candidate for better results.

Reset button in Evaluation Form will reset all cells to its original values, ("SELECT" or "YES/NO")

GO TO RESULTS button in Evaluation Form will go to results sheet.

GO TO EVALUATION FORM button in Results sheet will go to Evaluation Form sheet.

Top direction buttons in Evaluation Form and Results sheet will go top of results sheet.

Cells and sheets which are not use for users are locked and/or hidden due to security purposes.

Password for locking/unlocking is 12345

Password is given for modifying purposes. Before modification be sure to make a copy of original document.

Result form will give you an interpretation according to the author weighted tool score and also what should be done for improving results.

Result form also gives the other scores for user's interpretation; occurrences' or author or user weighted tool and user scores.

User may check each factor's score if s/he wishes.

**GO TO EVALUATION**

**GO TO RESULTS**



## Appendix C: Evaluation and Results

### 1. Mass transportation of Turkish Armed Forces Personnel

INSTRUCTIONS		RESET	GO TO RESULTS		
<b>FACTOR #1: Reduction in total cost of ownership, life cycle cost</b>					
1	What is the % of reduction expectation in total cost?—	N/A	1 Overall	How much total cost reduction is expected?	1:More than none
	What is the % of reduction expectation in contract cost?	5%		How important is 'total cost reduction' in selecting PBL as an acquisition method?	1:More than none
	What is the % of reduction expectation in human resources requirement?	15%			
	What is the % of reduction expectation in inventory cost?	10%			
<b>FACTOR #2: Presence, Determination of metrics, performance outcomes</b>					
2	How accurately are the requirements of goods/service defined?	6:Quite a bit	2 Overall	How well are the metrics determined regarding requirements?	5:Moderately
	How well are the metrics aligned to organization's goals?	7:More than quite a bit			
	How clear, understandable, solid, specific are the metrics?	8:Very			
	How realistic, sound are the metrics?	8:Very			
	How traceable are the metrics?	7:More than quite a bit			
	How measurable are the metrics?	6:Quite a bit			
	Are the metrics negotiated with candidates?	NO			
	How fair are the metrics for all partners?	3:More than a little			
	Are metrics expressed in any of those, below?	YES			
	*Operational availability_Readiness				
	*Operational reliability				
	*Cost per unit usage_Affordability				
	*Logistics footprint				
	*Logistics response time_Cycle time				
Is a target value set for each metrics?	YES				
How many metrics are planned to use in contract?	3				
<b>FACTOR #3: Improvement in performance</b>					
3	What is the improvement expectation in % for the 1st metrics?	1%	3 Overall	How much performance improvement is expected?	1:More than none
	What is the improvement expectation in % for the 2nd metrics?	1%			
	What is the improvement expectation in % for the 3rd metrics?	0%			
	What is the improvement expectation in % for the 4th metrics?	N/A			
	What is the improvement expectation in % for the 5th metrics?	N/A			
	What is the average improvement expectation in % for other metrics?	N/A			
<b>FACTOR #4: Partnership, strategic alliance</b>					
4	What type of relationship is expected to be built with provider?	lose - Short Term Relationship; 2	4 Overall	How well relationships is expected to be built, managed?	2:A little
	How much integration is expected to be built with provider?—	SELECT			
	How trustful are the partners to each other?	SELECT			
	How much information is planned to be shared with partners?—	SELECT			
	How much of physical network is planned to be shared among partners?—	SELECT			
	How much risk will be shared among partners?—	SELECT			
	How much of benefits will be shared among partners?—	SELECT			
	How well the relationships are managed?—	SELECT			
	How supportive is the management to culture change?—	SELECT			
	How acceptable is this culture change among employees?—	SELECT			
<b>FACTOR #5: Length of contract</b>					
5	What is the contract's planned length in years?	1	5 Overall	How sufficient is the contract's length?	2:A little
	How sufficient is the contract's length for return-on-investment allowance?—	SELECT			
	How sufficient is the contract's length for providing cash flow continuity to provider?—	SELECT			
	How sufficient is the contract's length to accomplish a certain performance level of the desired outcomes?—	SELECT			
<b>FACTOR #6: Flexibility</b>					
6	How flexible are the acquisition plan and the terms for provider's actions?—	N/A	6 Overall	How flexible is the acquisition plan for provider's actions?	1:More than none
	How much freedom is provided for contractor's actions?	1:More than none			
	How much decentralized is the authority?	2:A little			
	How much decentralized are the responsibilities?	1:More than none			
	How constraining are the acquisition plan and the terms with specifications, 'what' and 'how to do's?	6:Quite a bit			
	How constraining are financial, political, statutory barriers?	7:More than quite a bit			
<b>FACTOR #7: Better Service, Best Value Created, Best Practices</b>					
7	How well will the expected service quality be provided by organic structure in this partnership?	7:More than quite a bit	7 Overall	How well is the expected service quality provided by this partnership?	7:More than quite a bit
	How well will the expected service quality be provided by commercial structure in this partnership?	8:Very			
	How capable is the organic structure to manage life cycle of systems?—	SELECT			
	How qualified is the organic structure for directing supply chain?—	SELECT			
	How knowledgeable is the organic structure about system?—	SELECT			
	How experienced is the organic structure about system?—	SELECT			
	How skilled is the organic manpower regarding job to be done?—	SELECT			
	How skilled is the acquisition personnel regarding job to be done?—	SELECT			
	How capable is the commercial structure to manage life cycle of systems?—	SELECT			
	How qualified is the commercial structure for directing supply chain?—	SELECT			
	How knowledgeable is the commercial structure about system?—	SELECT			
	How experienced is the commercial structure about system?—	SELECT			
	How skilled is the commercial manpower regarding job to be done?—	SELECT			
	How well is the work allocation done between partners according to best practices?—	SELECT			

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FACTOR #8: Successful implementation of PBL, PBL experience and training		
8	How experienced is the 1st partner (organic) in PBL?	0:Not at all
	How experienced is the 2nd (commercial) partner in PBL?	1:More than none
	How experienced is the 3rd (commercial) partner in PBL?	0:Not at all
	How experienced are the other commercial partners in PBL as an average?	N/A
	How much importance is given to educational programs/training for PBL in partnership?	2:A little
	How trained/knowledgeable is the acquisition personnel about PBL?	2:A little
	How committed is the managements for the culture change?	2:A little

FACTOR #9: Innovation			
9	How constraining are the terms blocking innovational approaches?	6:Quite a bit	
	How incentivizing are the terms encouraging innovational approaches?	2:A little	
	How much freedom is present to encourage innovational approaches?	2:A little	
	People: How capable are the employees regarding well-known record of generating innovative ideas in this partnership?		4:Somewhat
	People: How important is screening innovation skills in hiring process in this partnership?		0:Not at all
	People: How important will innovation be as a factor at employees' performance evaluations in this partnership?		3:More than a little
	Process: How frequently will brainstorming and generating new ideas take place in this partnership?		4:Somewhat
	Process: How important will 'challenging the status quo/conventional ways' be in this partnership?		3:More than a little
	Process: How interactive will this partnership be for seeking opportunities with customers, competitors, suppliers, etc.?		2:A little
	Process: How spreaded will 'the networking through outside of this partnership' be for new ideas?		1:More than none
	Process: How supportive will this partnership be for adopting pilot programs or experiments?		0:Not at all
	Philosophies: How encouraging will this partnership be to employees to offer creative ideas?		3:More than a little
	Philosophies: How supportive will this partnership be to risk taking for new ideas?		2:A little

FACTOR #10: Data availability		
10	How adequate is historical data?	6:Quite a bit
	How accurate is historical data?	5:Moderately
	How adequate is cost data?	6:Quite a bit
	How accurate is cost data?	5:Moderately
	How adequate will the expected recent data be for metrics' evaluation?	6:Quite a bit
	How accurate will the expected recent data be for metrics' evaluation?	6:Quite a bit
	How many years of performance data is in hand?	2:Years and more
	How attainable will the expected recent data/values of metrics be?	8:Very
	How timely is the data management as a level of real time?	8:Very
	How adequate are the data collection tools?	6:Quite a bit
	How sufficient is the market for cost estimation?	6:Quite a bit

FACTOR #11: Candidates and competition		
11	How constraining are the terms blocking competition?	2:A little
	Are alternative systems considered to meet requirements?	NO
	Are qualified international sources permitted to enter?	NO
	How sufficient is 'the number of candidates' willing to enter PBL partnership?	6:Quite a bit
	In case of sole candidate; is the candidate OEM/Prime Vendor or other?	N/A
	How many partners are present in PBL including buyer?	3

FACTOR #12: Properties of system		
12	Is contract's subject a new goods/service?	NO
	How critical is the goods/service regarding strategic importance?	4:Somewhat
	How technologically advanced are the requirements regarding the goods/service?	1:More than none
	How complex is the goods/service?	1:More than none
	What is the percentage of expected life left on goods/service?	Continuous
	How reliable is the goods/service?	7:More than quite a bit
	How much investment is required for insourcing?	3:More than a little

FACTOR #13: Up-front, early planning		
13	Is 'PBL decision' given early in acquisition of system?	SELECT
	Is 'sustainment of the system as it is being designed' well-planned up-front?	SELECT
	Is 'service of the system serviced in the field' well-planned up-front?	SELECT
	Is 'partnering of industry and service branch support personnel in sustaining that asset' well-planned up-front?	SELECT
	Is 'determination of the multiple responsibilities' well-planned up-front?	SELECT

8	Overall	How experienced is this partnership in PBL?	1:More than none
		How important is 'experience in PBL' in selecting PBL as an acquisition method?	7:More than quite a bit

9	Overall	How innovative is this partnership?	2:A little
		How important is 'innovation' in selecting PBL as an acquisition method?	7:More than quite a bit

10	Overall	How sufficient are the available data and data collection?	8:Very
		How important is 'the data availability' in selecting PBL as an acquisition method?	8:Very

11	Overall	How sufficient is the competition?	5:Moderately
		How important is 'the competition' in selecting PBL as an acquisition method?	7:More than quite a bit

12	Overall	How important/critical is the system?	4:Somewhat
		How important is 'the system's criticality' in selecting PBL as an acquisition method?	9:More than very

13	Overall	How well is the up-front, early planning done?	SELECT
		How important is 'up-front, early planning' in selecting PBL as an acquisition method?	SELECT

INSTRUCTIONS

RESET

GO TO RESULTS

## GO TO EVALUATION

According to author's weighted tool score PBL fits for this acquisition by 31.9 %.  
PBL might not be the best acquisition strategy. Business case analysis is advised.

### General Scores:

To have a more successful PBL pay more attention to improve the factors below:  
Reduction in total cost of ownership, life cycle cost; Presence, Determination of metrics, performance outcomes; Improvement in performance; Partnership, strategic alliance; Length of contract; Flexibility; Better Service, Best Value Created, Best Practices ; Successful implementation of PBL, PBL experience and training; Innovation; Data availability; Candidates and competition; Properties of system; .

Occurrences' weighted Tool Score	3.1356
Author's weighted Tool Score	3.1886
User's weighted Tool Score	3.6804
Occurrences' weighted User's Score	2.8108
Author's weighted User's Score	2.9650
User's weighted User's Score	3.5287

#### FACTOR #1: Reduction in total cost of ownership, life cycle cost

<b>1</b>	Tool Evaluation	2.1875	Occurrences' weight	0.129	Occurrences' weighted Tool Score	0.2823
	User's Score	1.0000	Author's weight	0.060	Author's weighted Tool Score	0.1313
			User's weight	0.011	User's weighted Tool Score	0.0251
					Occurrences' weighted User's Score	0.1290
					Author's weighted User's Score	0.0600
					User's weighted User's Score	0.0115



#### FACTOR #2: Presence, Determination of metrics, performance outcomes

<b>2</b>	Tool Evaluation	6.8182	Occurrences' weight	0.120	Occurrences' weighted Tool Score	0.8211
	User's Score	5.0000	Author's weight	0.130	Author's weighted Tool Score	0.8864
			User's weight	0.092	User's weighted Tool Score	0.6270
					Occurrences' weighted User's Score	0.6022
					Author's weighted User's Score	0.6500
					User's weighted User's Score	0.4598



#### FACTOR #3: Improvement in performance

<b>3</b>	Tool Evaluation	0.3333	Occurrences' weight	0.112	Occurrences' weighted Tool Score	0.0373
	User's Score	1.0000	Author's weight	0.130	Author's weighted Tool Score	0.0433
			User's weight	0.092	User's weighted Tool Score	0.0307
					Occurrences' weighted User's Score	0.1118
					Author's weighted User's Score	0.1300
					User's weighted User's Score	0.0920



#### FACTOR #4: Partnership, strategic alliance

<b>4</b>	Tool Evaluation	2.0000	Occurrences' weight	0.037	Occurrences' weighted Tool Score	0.0731
	User's Score	2.0000	Author's weight	0.110	Author's weighted Tool Score	0.2200
			User's weight	0.092	User's weighted Tool Score	0.1839
					Occurrences' weighted User's Score	0.0731
					Author's weighted User's Score	0.2200
					User's weighted User's Score	0.1839



#### FACTOR #5: Length of contract

<b>5</b>	Tool Evaluation	0.0000	Occurrences' weight	0.088	Occurrences' weighted Tool Score	0.0000
	User's Score	2.0000	Author's weight	0.090	Author's weighted Tool Score	0.0000
			User's weight	0.092	User's weighted Tool Score	0.0000
					Occurrences' weighted User's Score	0.1763
					Author's weighted User's Score	0.1800
					User's weighted User's Score	0.1839



#### FACTOR #6: Flexibility

<b>6</b>	Tool Evaluation	2.2000	Occurrences' weight	0.084	Occurrences' weighted Tool Score	0.1845
	User's Score	1.0000	Author's weight	0.100	Author's weighted Tool Score	0.2200
			User's weight	0.080	User's weighted Tool Score	0.1770
					Occurrences' weighted User's Score	0.0839
					Author's weighted User's Score	0.1000
					User's weighted User's Score	0.0805



#### FACTOR #7: Better Service, Best Value Created, Best Practices

<b>7</b>	Tool Evaluation	7.5000	Occurrences' weight	0.082	Occurrences' weighted Tool Score	0.6129
	User's Score	7.0000	Author's weight	0.080	Author's weighted Tool Score	0.6000
			User's weight	0.103	User's weighted Tool Score	0.7759
					Occurrences' weighted User's Score	0.5720
					Author's weighted User's Score	0.5600
					User's weighted User's Score	0.7241



<b>FACTOR #8: Successful implementation of PBL, PBL experience and training</b>						
<b>8</b>	Tool Evaluation	1.1667	Occurrences' weight	0.073	Occurrences' weighted Tool Score	0.0853
	User's Score	1.0000	Author's weight	0.090	Author's weighted Tool Score	0.1050
			User's weight	0.080	User's weighted Tool Score	0.0939
					Occurrences' weighted User's Score	0.0731
					Author's weighted User's Score	0.0900
					User's weighted User's Score	0.0805



<b>FACTOR #9: Innovation</b>						
<b>9</b>	Tool Evaluation	2.4333	Occurrences' weight	0.060	Occurrences' weighted Tool Score	0.1465
	User's Score	2.0000	Author's weight	0.060	Author's weighted Tool Score	0.1460
			User's weight	0.080	User's weighted Tool Score	0.1958
					Occurrences' weighted User's Score	0.1204
					Author's weighted User's Score	0.1200
					User's weighted User's Score	0.1609



<b>FACTOR #10: Data availability</b>						
<b>10</b>	Tool Evaluation	6.5455	Occurrences' weight	0.058	Occurrences' weighted Tool Score	0.3801
	User's Score	8.0000	Author's weight	0.055	Author's weighted Tool Score	0.3600
			User's weight	0.092	User's weighted Tool Score	0.6019
					Occurrences' weighted User's Score	0.4645
					Author's weighted User's Score	0.4400
					User's weighted User's Score	0.7356



<b>FACTOR #11: Candidates and competition</b>						
<b>11</b>	Tool Evaluation	7.3333	Occurrences' weight	0.052	Occurrences' weighted Tool Score	0.3785
	User's Score	5.0000	Author's weight	0.035	Author's weighted Tool Score	0.2567
			User's weight	0.080	User's weighted Tool Score	0.5900
					Occurrences' weighted User's Score	0.2581
					Author's weighted User's Score	0.1750
					User's weighted User's Score	0.4023



<b>FACTOR #12: Properties of system</b>						
<b>12</b>	Tool Evaluation	3.6667	Occurrences' weight	0.037	Occurrences' weighted Tool Score	0.1341
	User's Score	4.0000	Author's weight	0.060	Author's weighted Tool Score	0.2200
			User's weight	0.103	User's weighted Tool Score	0.3793
					Occurrences' weighted User's Score	0.1462
					Author's weighted User's Score	0.2400
					User's weighted User's Score	0.4138



<b>FACTOR #13: Up-front, early planning</b>						
<b>13</b>	Tool Evaluation	0.0000	Occurrences' weight	0.000	Occurrences' weighted Tool Score	0.0000
	User's Score	SELECT	Author's weight	0.000	Author's weighted Tool Score	0.0000
			User's weight	0.000	User's weighted Tool Score	0.0000
					Occurrences' weighted User's Score	0.0000
					Author's weighted User's Score	0.0000
					User's weighted User's Score	0.0000



## 2. Meal Service for Privates

INSTRUCTIONS		RESET	GO TO RESULTS				
<b>FACTOR #1: Reduction in total cost of ownership, life cycle cost</b>							
1	What is the % of reduction expectation in total cost?	5%	1	Overall	How much total cost reduction is expected?	2:A little	
	What is the % of reduction expectation in contract cost?	SELECT		How important is 'total cost reduction' in selecting PBL as an acquisition method?	5: Moderately		
	What is the % of reduction expectation in human resources requirement?	SELECT					
	What is the % of reduction expectation in inventory cost?	SELECT					
<b>FACTOR #2: Presence, Determination of metrics, performance outcomes</b>							
2	How accurately are the requirements of goods/service defined?	3: More than a little	2	Overall	How well are the metrics determined regarding requirements?	5: Moderately	
	How well are the metrics aligned to organization's goals?	6: Quite a bit			How important is 'well determination of metrics' in selecting PBL as an acquisition method?	10: Extremely	
	How clear, understandable, solid, specific are the metrics?	6: Quite a bit					
	How realistic, sound are the metrics?	4: Somewhat					
	How traceable are the metrics?	3: More than a little					
	How measurable are the metrics?	3: More than a little					
	Are the metrics negotiated with candidates?	NO					
	How fair are the metrics for all partners?	4: Somewhat					
	Are metrics expressed in any of those, below?	YES					
	*Operational availability_Readiness						
	*Operational reliability						
	*Cost per unit usage_Affordability						
	*Logistics footprint						
	*Logistics response time_Cycle time						
Is a target value set for each metrics?	YES						
How many metrics are planned to use in contract?	6						
<b>FACTOR #3: Improvement in performance</b>							
3	What is the improvement expectation in % for the 1st metrics?	5%	3	Overall	How much performance improvement is expected?	1: More than none	
	What is the improvement expectation in % for the 2nd metrics?	5%			How important is 'performance improvement' in selecting PBL as an acquisition method?	6: Quite a bit	
	What is the improvement expectation in % for the 3rd metrics?	0%					
	What is the improvement expectation in % for the 4th metrics?	0%					
	What is the improvement expectation in % for the 5th metrics?	0%					
	What is the average improvement expectation in % for other metrics?	0%					
<b>FACTOR #4: Partnership, strategic alliance</b>							
4	What type of relationship is expected to be built with provider?	lose - Short Term Relationship	4	Overall	How well relationships is expected to be built, managed?	2:A little	
	How much integration is expected to be built with provider?	SELECT			How important is 'relationship between partners' in selecting PBL as an acquisition method?	2:A little	
	How trustful are the partners to each other?	SELECT					
	How much information is planned to be shared with partners?	SELECT					
	How much of physical network is planned to be shared among partners?	SELECT					
	How much risk will be shared among partners?	SELECT					
	How much of benefits will be shared among partners?	SELECT					
	How well the relationships are managed?	SELECT					
	How supportive is the management to culture change?	SELECT					
	How acceptable is this culture change among employees?	SELECT					
<b>FACTOR #5: Length of contract</b>							
5	What is the contract's planned length in years?	1	5	Overall	How sufficient is the contract's length?	1: More than none	
	How sufficient is the contract's length for return on investment allowance?	SELECT			How important is 'the contract's length' in selecting PBL as an acquisition method?	5: Moderately	
	How sufficient is the contract's length for providing cash flow continuity to provider?	SELECT					
	How sufficient is the contract's length to accomplish a certain performance level of the desired outcomes?	SELECT					
<b>FACTOR #6: Flexibility</b>							
6	How flexible are the acquisition plan and the terms for provider's actions?	N/A	6	Overall	How flexible is the acquisition plan for provider's actions?	1: More than none	
	How much freedom is provided for contractor's actions?	1: More than none			How important is 'flexibility' in selecting PBL as an acquisition method?	4: Somewhat	
	How much decentralized is the authority?	1: More than none					
	How much decentralized are the responsibilities?	1: More than none					
	How constraining are the acquisition plan and the terms with specifications, 'what' and 'how to do's?	9: More than very					
	How constraining are financial, political, statutory barriers?	9: More than very					
<b>FACTOR #7: Better Service, Best Value Created, Best Practices</b>							
7	How well will the expected service quality be provided by organic structure in this partnership?	3: More than a little	7	Overall	How well is the expected service quality provided by this partnership?	5: Moderately	
	How well will the expected service quality be provided by commercial structure in this partnership?	8: Very			How important is 'the expected service quality' in selecting PBL as an acquisition method?	9: More than very	
	How capable is the organic structure to manage life cycle of system?	SELECT					
	How qualified is the organic structure for directing supply chain?	SELECT					
	How knowledgeable is the organic structure about system?	SELECT					
	How experienced is the organic structure about system?	SELECT					
	How skilled is the organic manpower regarding job to be done?	SELECT					
	How skilled is the acquisition personnel regarding job to be done?	SELECT					
	How capable is the commercial structure to manage life cycle of system?	SELECT					
	How qualified is the commercial structure for directing supply chain?	SELECT					
	How knowledgeable is the commercial structure about system?	SELECT					
	How experienced is the commercial structure about system?	SELECT					
	How skilled is the commercial manpower regarding job to be done?	SELECT					
	How well is the work allocation done between partners according to best practices?	SELECT					

FACTOR #8: Successful implementation of PBL, PBL experience and training		
8	How experienced is the 1st partner (organic) in PBL?	0Not at all
	How experienced is the 2nd (commercial) partner in PBL?	0Not at all
	How experienced is the 3rd (commercial) partner in PBL?	N/A
	How experienced are the other commercial partners in PBL as an average?	N/A
	How much importance is given to educational programs/training for PBL in partnership?	2A little
	How trained/knowledgeable is the acquisition personnel about PBL?	0Not at all
How committed is the managements for the culture change?		1More than none

8	Overall	How experienced is this partnership in PBL?	0Not at all
		How important is 'experience in PBL' in selecting PBL as an acquisition method?	6Quite a bit

FACTOR #9: Innovation			
9	How constraining are the terms blocking innovational approaches?	8Very	
	How incentivizing are the terms encouraging innovational approaches?	1More than none	
	How much freedom is present to encourage innovational approaches?	0Not at all	
	People: How capable are the employees regarding well-known record of generating innovative ideas in this partnership?		1More than none
	People: How important is screening innovation skills in hiring process in this partnership?		0Not at all
	People: How important will innovation be as a factor at employees' performance evaluations in this partnership?		0Not at all
	Process: How frequently will brainstorming and generating new ideas take place in this partnership?		N/A
	Process: How important will 'challenging the status quo/conventional ways' be in this partnership?		N/A
	Process: How interactive will this partnership be for seeking opportunities with customers, competitors, suppliers, etc.?		0Not at all
	Process: How spreaded will 'the networking through outside of this partnership' be for new ideas?		N/A
	Process: How supportive will this partnership be for adopting pilot programs or experiments?		0Not at all
	Philosophies: How encouraging will this partnership be to employees to offer creative ideas?		0Not at all
	Philosophies: How supportive will this partnership be to risk taking for new ideas?		0Not at all

9	Overall	How innovative is this partnership?	1More than none
		How important is 'innovation' in selecting PBL as an acquisition method?	4Somewhat

FACTOR #10: Data availability		
10	How adequate is historical data?	1More than none
	How accurate is historical data?	1More than none
	How adequate is cost data?	2A little
	How accurate is cost data?	2A little
	How adequate will the expected recent data be for metrics' evaluation?	4Somewhat
	How accurate will the expected recent data be for metrics' evaluation?	4Somewhat
	How many years of performance data is in hand?	Less than 2.5 Months
	How attainable will the expected recent data/values of metrics be?	4Somewhat
	How timely is the data management as a level of real time?	5Moderately
	How adequate are the data collection tools?	4Somewhat
How sufficient is the market for cost estimation?		6Quite a bit

10	Overall	How sufficient are the available data and data collection?	2A little
		How important is 'the data availability' in selecting PBL as an acquisition method?	6Quite a bit

FACTOR #11: Candidates and competition		
11	How constraining are the terms blocking competition?	1More than none
	Are alternative systems considered to meet requirements?	YES
	Are qualified international sources permitted to enter?	NO
	How sufficient is 'the number of candidates' willing to enter PBL partnership?	7More than quite a bit
	In case of sole candidate; is the candidate OEM/Prime Vendor or other?	OTHER
	How many partners are present in PBL including buyer?	2

11	Overall	How sufficient is the competition?	7More than quite a bit
		How important is 'the competition' in selecting PBL as an acquisition method?	7More than quite a bit

FACTOR #12: Properties of system		
12	Is contract's subject a new goods/service?	NO
	How critical is the goods/service regarding strategic importance?	2A little
	How technologically advanced are the requirements regarding the goods/service?	0Not at all
	How complex is the goods/service?	0Not at all
	What is the percentage of expected life left on goods/service?	Continuous
	How reliable is the goods/service?	8Very
	How much investment is required for insourcing?	1More than none

12	Overall	How important/critical is the system?	2A little
		How important is 'the system's criticality' in selecting PBL as an acquisition method?	5Moderately

FACTOR #13: Up-front, early planning		
13	Is 'PBL decision' given early in acquisition of system?	SELECT
	Is 'sustainment of the system as it is being designed' well-planned up-front?	SELECT
	Is 'service of the system serviced in the field' well-planned up-front?	SELECT
	Is 'partnering of industry and service branch support personnel in sustaining that asset' well-planned up-front?	SELECT
	Is 'determination of the multiple responsibilities' well-planned up-front?	SELECT

13	Overall	How well is the up-front, early planning done?	SELECT
		How important is 'up-front, early planning' in selecting PBL as an acquisition method?	SELECT

INSTRUCTIONS

RESET

GO TO RESULTS

TOP

## GO TO EVALUATION

According to author's weighted tool score PBL fits for this acquisition by 22.6 %.  
PBL might not be the best acquisition strategy. Business case analysis is advised.

To have a more successful PBL pay more attention to improve the factors below:

Reduction in total cost of ownership, life cycle cost; Presence, Determination of metrics, performance outcomes; Improvement in performance; Partnership, strategic alliance; Length of contract; Flexibility; Better Service, Best Value Created, Best Practices ; Successful implementation of PBL, PBL experience and training; Innovation; Data availability; Properties of system; .

### General Scores:

Occurrences' weighted Tool Score	2.2329
Author's weighted Tool Score	2.2550
User's weighted Tool Score	3.1413
Occurrences' weighted User's Score	2.2366
Author's weighted User's Score	2.2450
User's weighted User's Score	2.8841

#### FACTOR #1: Reduction in total cost of ownership, life cycle cost

<b>1</b>	Tool Evaluation	1.2500	Occurrences' weight	0.129	Occurrences' weighted Tool Score	0.1613
	User's Score	2.0000	Author's weight	0.060	Author's weighted Tool Score	0.0750
			User's weight	0.072	User's weighted Tool Score	0.0906
					Occurrences' weighted User's Score	0.2581
					Author's weighted User's Score	0.1200
					User's weighted User's Score	0.1449



#### FACTOR #2: Presence, Determination of metrics, performance outcomes

<b>2</b>	Tool Evaluation	4.4545	Occurrences' weight	0.120	Occurrences' weighted Tool Score	0.5365
	User's Score	5.0000	Author's weight	0.130	Author's weighted Tool Score	0.5791
			User's weight	0.145	User's weighted Tool Score	0.6456
					Occurrences' weighted User's Score	0.6022
					Author's weighted User's Score	0.6500
					User's weighted User's Score	0.7246



#### FACTOR #3: Improvement in performance

<b>3</b>	Tool Evaluation	0.8333	Occurrences' weight	0.112	Occurrences' weighted Tool Score	0.0932
	User's Score	1.0000	Author's weight	0.130	Author's weighted Tool Score	0.1083
			User's weight	0.087	User's weighted Tool Score	0.0725
					Occurrences' weighted User's Score	0.1118
					Author's weighted User's Score	0.1300
					User's weighted User's Score	0.0870



#### FACTOR #4: Partnership, strategic alliance

<b>4</b>	Tool Evaluation	2.0000	Occurrences' weight	0.037	Occurrences' weighted Tool Score	0.0731
	User's Score	2.0000	Author's weight	0.110	Author's weighted Tool Score	0.2200
			User's weight	0.029	User's weighted Tool Score	0.0580
					Occurrences' weighted User's Score	0.0731
					Author's weighted User's Score	0.2200
					User's weighted User's Score	0.0580



#### FACTOR #5: Length of contract

<b>5</b>	Tool Evaluation	0.0000	Occurrences' weight	0.088	Occurrences' weighted Tool Score	0.0000
	User's Score	1.0000	Author's weight	0.090	Author's weighted Tool Score	0.0000
			User's weight	0.072	User's weighted Tool Score	0.0000
					Occurrences' weighted User's Score	0.0882
					Author's weighted User's Score	0.0900
					User's weighted User's Score	0.0725



#### FACTOR #6: Flexibility

<b>6</b>	Tool Evaluation	1.0000	Occurrences' weight	0.084	Occurrences' weighted Tool Score	0.0839
	User's Score	1.0000	Author's weight	0.100	Author's weighted Tool Score	0.1000
			User's weight	0.058	User's weighted Tool Score	0.0580
					Occurrences' weighted User's Score	0.0839
					Author's weighted User's Score	0.1000
					User's weighted User's Score	0.0580



#### FACTOR #7: Better Service, Best Value Created, Best Practices

<b>7</b>	Tool Evaluation	5.5000	Occurrences' weight	0.082	Occurrences' weighted Tool Score	0.4495
	User's Score	5.0000	Author's weight	0.080	Author's weighted Tool Score	0.4400
			User's weight	0.130	User's weighted Tool Score	0.7174
					Occurrences' weighted User's Score	0.4086
					Author's weighted User's Score	0.4000
					User's weighted User's Score	0.6522



<b>8</b>	FACTOR #8: Successful implementation of PBL, PBL experience and training						<b>T O P</b>
	Tool Evaluation	0.5000	Occurrences' weight	0.073	Occurrences' weighted Tool Score	0.0366	
	User's Score	0.0000	Author's weight	0.090	Author's weighted Tool Score	0.0450	
			User's weight	0.087	User's weighted Tool Score	0.0435	
					Occurrences' weighted User's Score	0.0000	
					Author's weighted User's Score	0.0000	
					User's weighted User's Score	0.0000	
<b>9</b>	FACTOR #9: Innovation						<b>T O P</b>
	Tool Evaluation	0.5714	Occurrences' weight	0.060	Occurrences' weighted Tool Score	0.0344	
	User's Score	1.0000	Author's weight	0.060	Author's weighted Tool Score	0.0343	
			User's weight	0.058	User's weighted Tool Score	0.0331	
					Occurrences' weighted User's Score	0.0602	
					Author's weighted User's Score	0.0600	
					User's weighted User's Score	0.0580	
<b>10</b>	FACTOR #10: Data availability						<b>T O P</b>
	Tool Evaluation	3.0000	Occurrences' weight	0.058	Occurrences' weighted Tool Score	0.1742	
	User's Score	2.0000	Author's weight	0.055	Author's weighted Tool Score	0.1650	
			User's weight	0.087	User's weighted Tool Score	0.2609	
					Occurrences' weighted User's Score	0.1161	
					Author's weighted User's Score	0.1100	
					User's weighted User's Score	0.1739	
<b>11</b>	FACTOR #11: Candidates and competition						<b>T O P</b>
	Tool Evaluation	9.6667	Occurrences' weight	0.052	Occurrences' weighted Tool Score	0.4989	
	User's Score	7.0000	Author's weight	0.035	Author's weighted Tool Score	0.3383	
			User's weight	0.101	User's weighted Tool Score	0.9807	
					Occurrences' weighted User's Score	0.3613	
					Author's weighted User's Score	0.2450	
					User's weighted User's Score	0.7101	
<b>12</b>	FACTOR #12: Properties of system						<b>T O P</b>
	Tool Evaluation	2.5000	Occurrences' weight	0.037	Occurrences' weighted Tool Score	0.0914	
	User's Score	2.0000	Author's weight	0.060	Author's weighted Tool Score	0.1500	
			User's weight	0.072	User's weighted Tool Score	0.1812	
					Occurrences' weighted User's Score	0.0731	
					Author's weighted User's Score	0.1200	
					User's weighted User's Score	0.1449	
<b>13</b>	FACTOR #13: Up front early planning						<b>T O P</b>
	Tool Evaluation	0.0000	Occurrences' weight	0.000	Occurrences' weighted Tool Score	0.0000	
	User's Score	SELECT	Author's weight	0.000	Author's weighted Tool Score	0.0000	
			User's weight	0.000	User's weighted Tool Score	0.0000	
					Occurrences' weighted User's Score	0.0000	
					Author's weighted User's Score	0.0000	
					User's weighted User's Score	0.0000	



### 3. ANKA Turkish Unmanned Aerial Vehicle Support Program

INSTRUCTIONS		RESET	GO TO RESULTS				
<b>FACTOR #1: Reduction in total cost of ownership, life cycle cost</b>							
1	What is the % of reduction expectation in total cost?	N/A	1	Overall	How much total cost reduction is expected?	5: Moderately	
	What is the % of reduction expectation in contract cost?	28%		How important is 'total cost reduction' in selecting PBL as an acquisition method?	8: Very		
	What is the % of reduction expectation in human resources requirement?	5%					
	What is the % of reduction expectation in inventory cost?	5%					
<b>FACTOR #2: Presence, Determination of metrics, performance outcomes</b>							
2	How accurately are the requirements of goods/service defined?	7: More than quite a bit	2	Overall	How well are the metrics determined regarding requirements?	7: More than quite a bit	
	How well are the metrics aligned to organization's goals?	8: Very			How important is 'well determination of metrics' in selecting PBL as an acquisition method?	8: Very	
	How clear, understandable, solid, specific are the metrics?	8: Very					
	How realistic, sound are the metrics?	7: More than quite a bit					
	How traceable are the metrics?	7: More than quite a bit					
	How measurable are the metrics?	8: Very					
	Are the metrics negotiated with candidates?	NO					
	How fair are the metrics for all partners?	6: Quite a bit					
	Are metrics expressed in any of those, below?	YES					
	*Operational availability_Readiness						
	*Operational reliability						
	*Cost per unit usage_Affordability						
	*Logistics footprint						
	*Logistics response time_Cycle time						
Is a target value set for each metrics?	YES						
How many metrics are planned to use in contract?	2						
<b>FACTOR #3: Improvement in performance</b>							
3	What is the improvement expectation in % for the 1st metrics?	10%	3	Overall	How much performance improvement is expected?	5: Moderately	
	What is the improvement expectation in % for the 2nd metrics?	5%			How important is 'performance improvement' in selecting PBL as an acquisition method?	7: More than quite a bit	
	What is the improvement expectation in % for the 3rd metrics?	N/A					
	What is the improvement expectation in % for the 4th metrics?	N/A					
	What is the improvement expectation in % for the 5th metrics?	N/A					
	What is the average improvement expectation in % for other metrics?	N/A					
<b>FACTOR #4: Partnership, strategic alliance</b>							
4	What type of relationship is expected to be built with provider?	Not-Applicable-	4	Overall	How well relationships is expected to be built, managed?	8: Very	
	How much integration is expected to be built with provider?	8: Very			How important is 'relationship between partners' in selecting PBL as an acquisition method?	8: Very	
	How trustful are the partners to each other?	6: Quite a bit					
	How much information is planned to be shared with partners?	5: Moderately					
	How much of physical network is planned to be shared among partners?	5: Moderately					
	How much risk will be shared among partners?	3: More than a little					
	How much of benefits will be shared among partners?	7: More than quite a bit					
	How well the relationships are managed?	9: More than very					
	How supportive is the management to culture change?	9: More than very					
	How acceptable is this culture change among employees?	4: Somewhat					
<b>FACTOR #5: Length of contract</b>							
5	What is the contract's planned length in years?	5	5	Overall	How sufficient is the contract's length?	8: Very	
	How sufficient is the contract's length for return-on-investment allowance?	SELECT			How important is 'the contract's length' in selecting PBL as an acquisition method?	8: Very	
	How sufficient is the contract's length for providing cash flow continuity to provider?	SELECT					
	How sufficient is the contract's length to accomplish a certain performance level of the desired outcomes?	SELECT					
<b>FACTOR #6: Flexibility</b>							
6	How flexible are the acquisition plan and the terms for provider's actions?	N/A	6	Overall	How flexible is the acquisition plan for provider's actions?	6: Quite a bit	
	How much freedom is provided for contractor's actions?	5: Moderately			How important is 'Flexibility' in selecting PBL as an acquisition method?	8: Very	
	How much decentralized is the authority?	5: Moderately					
	How much decentralized are the responsibilities?	6: Quite a bit					
	How constraining are the acquisition plan and the terms with specifications, 'what' and 'how to do's?	3: More than a little					
	How constraining are financial, political, statutory barriers?	2: A little					
<b>FACTOR #7: Better Service, Best Value Created, Best Practices</b>							
7	How well will the expected service quality be provided by organic structure in this partnership?	N/A	7	Overall	How well is the expected service quality provided by this partnership?	7: More than quite a bit	
	How well will the expected service quality be provided by commercial structure in this partnership?	N/A			How important is 'the expected service quality' in selecting PBL as an acquisition method?	8: Very	
	How capable is the organic structure to manage life cycle of systems?	7: More than quite a bit					
	How qualified is the organic structure for directing supply chain?	7: More than quite a bit					
	How knowledgeable is the organic structure about system?	6: Quite a bit					
	How experienced is the organic structure about system?	2: A little					
	How skilled is the organic manpower regarding job to be done?	7: More than quite a bit					
	How skilled is the acquisition personnel regarding job to be done?	7: More than quite a bit					
	How capable is the commercial structure to manage life cycle of systems?	8: Very					
	How qualified is the commercial structure for directing supply chain?	8: Very					
	How knowledgeable is the commercial structure about system?	9: More than very					
	How experienced is the commercial structure about system?	9: More than very					
	How skilled is the commercial manpower regarding job to be done?	8: Very					
	How well is the work allocation done between partners according to best practices?	9: More than very					

FACTOR #8: Successful implementation of PBL, PBL experience and training		
8	How experienced is the 1st partner (organic) in PBL?	2:A little
	How experienced is the 2nd (commercial) partner in PBL?	2:A little
	How experienced is the 3rd (commercial) partner in PBL?	N/A
	How experienced are the other commercial partners in PBL as an average?	N/A
	How much importance is given to educational programs/training for PBL in partnership?	8:Very
	How trained/knowledgeable is the acquisition personnel about PBL?	1:More than none
How committed are the managements for the culture change?		9:More than very

FACTOR #9: Innovation		
9	How constraining are the terms blocking innovational approaches?	3:More than a little
	How incentivizing are the terms encouraging innovational approaches?	7:More than quite a bit
	How much freedom is present to encourage innovational approaches?	5:Moderately
	People: How capable are the employees regarding well-known record of generating innovative ideas in this partnership?	
	9:More than very	
	People: How important is screening innovation skills in hiring process in this partnership?	
	7:More than quite a bit	
	People: How important will innovation be as a factor at employees' performance evaluations in this partnership?	
	8:Very	
	Process: How frequently will brainstorming and generating new ideas take place in this partnership?	
	N/A	
	Process: How important will 'challenging the status quo/conventional ways' be in this partnership?	
	5:Moderately	
	Process: How interactive will this partnership be for seeking opportunities with customers, competitors, suppliers, etc.?	
7:More than quite a bit		
Process: How spreaded will 'the networking through outside of this partnership' be for new ideas?		
N/A		
Process: How supportive will this partnership be for adopting pilot programs or experiments?		
8:Very		
Philosophies: How encouraging will this partnership be to employees to offer creative ideas?		
7:More than quite a bit		
Philosophies: How supportive will this partnership be to risk taking for new ideas?		
N/A		

FACTOR #10: Data availability		
10	How adequate is historical data?	3:More than a little
	How accurate is historical data?	8:Very
	How adequate is cost data?	3:More than a little
	How accurate is cost data?	6:Quite a bit
	How adequate will the expected recent data be for metrics' evaluation?	9:More than very
	How accurate will the expected recent data be for metrics' evaluation?	9:More than very
	How many years of performance data is in hand?	2:Years and more
	How attainable will the expected recent data/values of metrics be?	9:More than very
	How timely is the data management as a level of real time?	9:More than very
	How adequate are the data collection tools?	8:Very
How sufficient is the market for cost estimation?		7:More than quite a bit

FACTOR #11: Candidates and competition		
11	How constraining are the terms blocking competition?	2:A little
	Are alternative systems considered to meet requirements?	YES
	Are qualified international sources permitted to enter?	YES
	How sufficient is 'the number of candidates' willing to enter PBL partnership?	8:Very
	In case of sole candidate; is the candidate OEM/Prime Vendor or other?	OEM/PRIME VENDOR
	How many partners are present in PBL including buyer?	2

FACTOR #12: Properties of system		
12	Is contract's subject a new goods/service?	YES
	How critical is the goods/service regarding strategic importance?	8:Very
	How technologically advanced are the requirements regarding the goods/service?	7:More than quite a bit
	How complex is the goods/service?	9:More than very
	What is the percentage of expected life left on goods/service?	100%
	How reliable is the goods/service?	6:Quite a bit
	How much investment is required for insourcing?	9:More than very

FACTOR #13: Up-front, early planning		
13	Is 'PBL decision' given early in acquisition of system?	YES
	Is 'sustainment of the system as it is being designed' well-planned up-front?	YES
	Is 'service of the system serviced in the field' well-planned up-front?	YES
	Is 'partnering of industry and service branch support personnel in sustaining that asset' well-planned up-front?	NO
	Is 'determination of the multiple responsibilities' well-planned up-front?	YES

8	Overall	How experienced is this partnership in PBL?	2:A little
		How important is 'experience in PBL' in selecting PBL as an acquisition method?	7:More than quite a bit
9	Overall	How innovative is this partnership?	7:More than quite a bit
		How important is 'innovation' in selecting PBL as an acquisition method?	9:More than very
10	Overall	How sufficient are the available data and data collection?	5:Moderately
		How important is 'the data availability' in selecting PBL as an acquisition method?	9:More than very
11	Overall	How sufficient is the competition?	9:More than very
		How important is 'the competition' in selecting PBL as an acquisition method?	5:Moderately
12	Overall	How important/critical is the system?	8:Very
		How important is 'the system's criticality' in selecting PBL as an acquisition method?	6:Quite a bit
13	Overall	How well is the up-front, early planning done?	6:Quite a bit
		How important is 'up-front, early planning' in selecting PBL as an acquisition method?	7:More than quite a bit

INSTRUCTIONS

RESET

GO TO RESULTS

## GO TO EVALUATION

According to author's weighted tool score PBL fits for this acquisition by 61.5 %.

PBL is advised as an acquisition strategy. Business case analysis is required.

To have a more successful PBL pay more attention to improve the factors below:

Reduction in total cost of ownership, life cycle cost; Presence, Determination of metrics, performance outcomes; Improvement in performance; Partnership, strategic alliance; Length of contract;

Flexibility; Better Service, Best Value Created, Best Practices ; Successful implementation of PBL,

PBL experience and training; Innovation; Data availability; Up-front, early planning.

### General Scores:

Occurrences' weighted Tool Score	6.0659
Author's weighted Tool Score	6.1462
User's weighted Tool Score	6.3938
Occurrences' weighted User's Score	6.2765
Author's weighted User's Score	6.2800
User's weighted User's Score	6.3265

#### FACTOR #1: Reduction in total cost of ownership, life cycle cost

<b>1</b>	Tool Evaluation	4.1250	Occurrences' weight	0.125	Occurrences' weighted Tool Score	0.5146
	User's Score	5.0000	Author's weight	0.050	Author's weighted Tool Score	0.2063
			User's weight	0.082	User's weighted Tool Score	0.3367
					Occurrences' weighted User's Score	0.6237
					Author's weighted User's Score	0.2500
					User's weighted User's Score	0.4082



#### FACTOR #2: Presence, Determination of metrics, performance outcomes

<b>2</b>	Tool Evaluation	7.3636	Occurrences' weight	0.116	Occurrences' weighted Tool Score	0.8573
	User's Score	7.0000	Author's weight	0.125	Author's weighted Tool Score	0.9205
			User's weight	0.082	User's weighted Tool Score	0.6011
					Occurrences' weighted User's Score	0.8150
					Author's weighted User's Score	0.8750
					User's weighted User's Score	0.5714



#### FACTOR #3: Improvement in performance

<b>3</b>	Tool Evaluation	3.7500	Occurrences' weight	0.108	Occurrences' weighted Tool Score	0.4054
	User's Score	5.0000	Author's weight	0.125	Author's weighted Tool Score	0.4688
			User's weight	0.071	User's weighted Tool Score	0.2679
					Occurrences' weighted User's Score	0.5405
					Author's weighted User's Score	0.6250
					User's weighted User's Score	0.3571



#### FACTOR #4: Partnership, strategic alliance

<b>4</b>	Tool Evaluation	6.2222	Occurrences' weight	0.102	Occurrences' weighted Tool Score	0.6339
	User's Score	8.0000	Author's weight	0.100	Author's weighted Tool Score	0.6222
			User's weight	0.082	User's weighted Tool Score	0.5079
					Occurrences' weighted User's Score	0.8150
					Author's weighted User's Score	0.8000
					User's weighted User's Score	0.6531



#### FACTOR #5: Length of contract

<b>5</b>	Tool Evaluation	5.0000	Occurrences' weight	0.085	Occurrences' weighted Tool Score	0.4262
	User's Score	8.0000	Author's weight	0.090	Author's weighted Tool Score	0.4500
			User's weight	0.082	User's weighted Tool Score	0.4082
					Occurrences' weighted User's Score	0.6819
					Author's weighted User's Score	0.7200
					User's weighted User's Score	0.6531



#### FACTOR #6: Flexibility

<b>6</b>	Tool Evaluation	6.2000	Occurrences' weight	0.081	Occurrences' weighted Tool Score	0.5027
	User's Score	6.0000	Author's weight	0.100	Author's weighted Tool Score	0.6200
			User's weight	0.082	User's weighted Tool Score	0.5061
					Occurrences' weighted User's Score	0.4865
					Author's weighted User's Score	0.6000
					User's weighted User's Score	0.4898



#### FACTOR #7: Better Service, Best Value Created, Best Practices

<b>7</b>	Tool Evaluation	7.2500	Occurrences' weight	0.079	Occurrences' weighted Tool Score	0.5728
	User's Score	7.0000	Author's weight	0.080	Author's weighted Tool Score	0.5800
			User's weight	0.082	User's weighted Tool Score	0.5918
					Occurrences' weighted User's Score	0.5530
					Author's weighted User's Score	0.5600
					User's weighted User's Score	0.5714



**FACTOR #8: Successful implementation of PBL, PBL experience and training**

<b>8</b>	Tool Evaluation	4.0000	Occurrences' weight	0.071	Occurrences' weighted Tool Score	0.2827
	User's Score	2.0000	Author's weight	0.090	Author's weighted Tool Score	0.3600
			User's weight	0.071	User's weighted Tool Score	0.2857
					Occurrences' weighted User's Score	0.1414
					Author's weighted User's Score	0.1800
					User's weighted User's Score	0.1429

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**FACTOR #9: Innovation**

<b>9</b>	Tool Evaluation	6.8095	Occurrences' weight	0.058	Occurrences' weighted Tool Score	0.3964
	User's Score	7.0000	Author's weight	0.060	Author's weighted Tool Score	0.4086
			User's weight	0.092	User's weighted Tool Score	0.6254
					Occurrences' weighted User's Score	0.4075
					Author's weighted User's Score	0.4200
					User's weighted User's Score	0.6429

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**FACTOR #10: Data availability**

<b>10</b>	Tool Evaluation	7.3636	Occurrences' weight	0.056	Occurrences' weighted Tool Score	0.4133
	User's Score	5.0000	Author's weight	0.055	Author's weighted Tool Score	0.4050
			User's weight	0.092	User's weighted Tool Score	0.6763
					Occurrences' weighted User's Score	0.2807
					Author's weighted User's Score	0.2750
					User's weighted User's Score	0.4592

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**FACTOR #11: Candidates and competition**

<b>11</b>	Tool Evaluation	10.0000	Occurrences' weight	0.050	Occurrences' weighted Tool Score	0.4990
	User's Score	9.0000	Author's weight	0.035	Author's weighted Tool Score	0.3500
			User's weight	0.051	User's weighted Tool Score	0.5102
					Occurrences' weighted User's Score	0.4491
					Author's weighted User's Score	0.3150
					User's weighted User's Score	0.4592

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**FACTOR #12: Properties of system**

<b>12</b>	Tool Evaluation	8.8333	Occurrences' weight	0.035	Occurrences' weighted Tool Score	0.3122
	User's Score	8.0000	Author's weight	0.060	Author's weighted Tool Score	0.5300
			User's weight	0.061	User's weighted Tool Score	0.5408
					Occurrences' weighted User's Score	0.2827
					Author's weighted User's Score	0.4800
					User's weighted User's Score	0.4898

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**FACTOR #13: Up-front, early planning**

<b>13</b>	Tool Evaluation	7.5000	Occurrences' weight	0.033	Occurrences' weighted Tool Score	0.2495
	User's Score	6.0000	Author's weight	0.030	Author's weighted Tool Score	0.2250
			User's weight	0.071	User's weighted Tool Score	0.5357
					Occurrences' weighted User's Score	0.1996
					Author's weighted User's Score	0.1800
					User's weighted User's Score	0.4286

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#### 4. Turkish Army's Advanced Armored Combat Vehicle (ACV) Support Program

INSTRUCTIONS		RESET	GO TO RESULTS			
<b>FACTOR #1: Reduction in total cost of ownership, life cycle cost</b>						
1	What is the % of reduction expectation in total cost?	40%	1	Overall	How much total cost reduction is expected?	7More than quite a bit
	What is the % of reduction expectation in contract cost?--	SELECT		How important is 'total cost reduction' in selecting PBL as an acquisition method?	7More than quite a bit	
	What is the % of reduction expectation in human resources requirement?--	SELECT				
	What is the % of reduction expectation in inventory cost?--	SELECT				
<b>FACTOR #2: Presence, Determination of metrics, performance outcomes</b>						
2	How accurately are the requirements of goods/service defined?	7More than quite a bit	2	Overall	How well are the metrics determined regarding requirements?	7More than quite a bit
	How well are the metrics aligned to organization's goals?	9More than very			How important is 'well determination of metrics' in selecting PBL as an acquisition method?	10Extremely
	How clear, understandable, solid, specific are the metrics?	7More than quite a bit				
	How realistic, sound are the metrics?	8Very				
	How traceable are the metrics?	7More than quite a bit				
	How measurable are the metrics?	9More than very				
	Are the metrics negotiated with candidates?	NO				
	How fair are the metrics for all partners?	7More than quite a bit				
	Are metrics expressed in any of those, below?	YES				
	*Operational availability_Readiness					
	*Operational reliability					
	*Cost per unit usage_Affordability					
	*Logistics footprint					
	*Logistics response time_Cycle time					
Is a target value set for each metrics?	YES					
How many metrics are planned to use in contract?	2					
<b>FACTOR #3: Improvement in performance</b>						
3	What is the improvement expectation in % for the 1st metrics?	5%	3	Overall	How much performance improvement is expected?	4Somewhat
	What is the improvement expectation in % for the 2nd metrics?	5%			How important is 'performance improvement' in selecting PBL as an acquisition method?	4Somewhat
	What is the improvement expectation in % for the 3rd metrics?	N/A				
	What is the improvement expectation in % for the 4th metrics?	N/A				
	What is the improvement expectation in % for the 5th metrics?	N/A				
	What is the average improvement expectation in % for other metrics?	N/A				
<b>FACTOR #4: Partnership, strategic alliance</b>						
4	What type of relationship is expected to be built with provider?	Partnership: 8	4	Overall	How well relationships is expected to be built, managed?	8Very
	How much integration is expected to be built with provider?--	SELECT			How important is 'relationship between partners' in selecting PBL as an acquisition method?	8Very
	How trustful are the partners to each other?	SELECT				
	How much information is planned to be shared with partners?--	SELECT				
	How much of physical network is planned to be shared among partners?--	SELECT				
	How much risk will be shared among partners?--	SELECT				
	How much of benefits will be shared among partners?--	SELECT				
	How well the relationships are managed?--	SELECT				
	How supportive is the management to culture change?--	SELECT				
	How acceptable is this culture change among employees?--	SELECT				
	<b>FACTOR #5: Length of contract</b>					
	5	What is the contract's planned length in years?		5	5	Overall
How sufficient is the contract's length for return-on-investment allowance?--		SELECT	How important is 'the contract's length' in selecting PBL as an acquisition method?	7More than quite a bit		
How sufficient is the contract's length for providing cash flow continuity to provider?--		SELECT				
How sufficient is the contract's length to accomplish a certain performance level of the desired outcomes?--		SELECT				
<b>FACTOR #6: Flexibility</b>						
6	How flexible are the acquisition plan and the terms for provider's actions?--	N/A	6	Overall	How flexible is the acquisition plan for provider's actions?	6Quite a bit
	How much freedom is provided for contractor's actions?	5Moderately			How important is 'flexibility' in selecting PBL as an acquisition method?	8Very
	How much decentralized is the authority?	6Quite a bit				
	How much decentralized are the responsibilities?	6Quite a bit				
	How constraining are the acquisition plan and the terms with specifications, 'what' and 'how to do's?	6Quite a bit				
	How constraining are financial, political, statutory barriers?	4Somewhat				
<b>FACTOR #7: Better Service, Best Value Created, Best Practices</b>						
7	How well will the expected service quality be provided by organic structure in this partnership?	8Very	7	Overall	How well is the expected service quality provided by this partnership?	9More than very
	How well will the expected service quality be provided by commercial structure in this partnership?	9More than very			How important is 'the expected service quality' in selecting PBL as an acquisition method?	5Moderately
	How capable is the organic structure to manage life cycle of systems?--	SELECT				
	How qualified is the organic structure for directing supply chain?--	SELECT				
	How knowledgeable is the organic structure about system?--	SELECT				
	How experienced is the organic structure about system?--	SELECT				
	How skilled is the organic manpower regarding job to be done?--	SELECT				
	How skilled is the acquisition personnel regarding job to be done?--	SELECT				
	How capable is the commercial structure to manage life cycle of systems?--	SELECT				
	How qualified is the commercial structure for directing supply chain?--	SELECT				
	How knowledgeable is the commercial structure about system?--	SELECT				
	How experienced is the commercial structure about system?--	SELECT				
	How skilled is the commercial manpower regarding job to be done?--	SELECT				
	How well is the work allocation done between partners according to best practices?--	SELECT				

FACTOR #8: Successful implementation of PBL, PBL experience and training			
8	How experienced is the 1st partner (organic) in PBL?	0:Not at all	
	How experienced is the 2nd (commercial) partner in PBL?	0:Not at all	
	How experienced is the 3rd (commercial) partner in PBL?	N/A	
	How experienced are the other commercial partners in PBL as an average?	N/A	
	How much importance is given to educational programs/training for PBL in partnership?	2:A little	
	How trained/knowledgeable is the acquisition personnel about PBL?	1:More than none	
How committed is the managements for the culture change?		6:Quite a bit	
FACTOR #9: Innovation			
9	How constraining are the terms blocking innovational approaches?	4:Somewhat	
	How incentivizing are the terms encouraging innovational approaches?	4:Somewhat	
	How much freedom is present to encourage innovational approaches?	5:Moderately	
	People: How capable are the employees regarding well-known record of generating innovative ideas in this partnership?		5:Moderately
	People: How important is screening innovation skills in hiring process in this partnership?		6:Quite a bit
	People: How important will innovation be as a factor at employees' performance evaluations in this partnership?		N/A
	Process: How frequently will brainstorming and generating new ideas take place in this partnership?		N/A
	Process: How important will 'challenging the status quo/conventional ways' be in this partnership?		N/A
	Process: How interactive will this partnership be for seeking opportunities with customers, competitors, suppliers, etc.?		N/A
	Process: How spreaded will 'the networking through outside of this partnership' be for new ideas?		7:More than quite a bit
	Process: How supportive will this partnership be for adopting pilot programs or experiments?		9:More than very
	Philosophies: How encouraging will this partnership be to employees to offer creative ideas?		N/A
	Philosophies: How supportive will this partnership be to risk taking for new ideas?		N/A
	FACTOR #10: Data availability		
10	How adequate is historical data?	4:Somewhat	
	How accurate is historical data?	4:Somewhat	
	How adequate is cost data?	6:Quite a bit	
	How accurate is cost data?	6:Quite a bit	
	How adequate will the expected recent data be for metrics' evaluation?	8:Very	
	How accurate will the expected recent data be for metrics' evaluation?	7:More than quite a bit	
	How many years of performance data is in hand?	1 Year	
	How attainable will the expected recent data/values of metrics be?	5:Moderately	
	How timely is the data management as a level of real time?	5:Moderately	
	How adequate are the data collection tools?	5:Moderately	
How sufficient is the market for cost estimation?	5:Moderately		
FACTOR #11: Candidates and competition			
11	How constraining are the terms blocking competition?	1:More than none	
	Are alternative systems considered to meet requirements?	YES	
	Are qualified international sources permitted to enter?	YES	
	How sufficient is 'the number of candidates' willing to enter PBL partnership?	5:Moderately	
	In case of sole candidate; is the candidate OEM/Prime Vendor or other?	OEM/PRIME VENDOR	
	How many partners are present in PBL including buyer?	2	
FACTOR #12: Properties of system			
12	Is contract's subject a new goods/service?	NO	
	How critical is the goods/service regarding strategic importance?	8:Very	
	How technologically advanced are the requirements regarding the goods/service?	6:Quite a bit	
	How complex is the goods/service?	5:Moderately	
	What is the percentage of expected life left on goods/service?	60%	
	How reliable is the goods/service?	4:Somewhat	
How much investment is required for insourcing?		2:A little	
FACTOR #13: Up-front, early planning			
13	Is 'PBL decision' given early in acquisition of system?	SELECT	
	Is 'sustainment of the system as it is being designed' well-planned up-front?	SELECT	
	Is 'service of the system serviced in the field' well-planned up-front?	SELECT	
	Is 'partnering of industry and service branch support personnel in sustaining that asset' well-planned up-front?	SELECT	
	Is 'determination of the multiple responsibilities' well-planned up-front?	SELECT	

8	Overall	How experienced is this partnership in PBL?	1:More than none
		How important is 'experience in PBL' in selecting PBL as an acquisition method?	8:Very
9	Overall	How innovative is this partnership?	7:More than quite a bit
		How important is 'innovation' in selecting PBL as an acquisition method?	9:More than very
10	Overall	How sufficient are the available data and data collection?	5:Moderately
		How important is 'the data availability' in selecting PBL as an acquisition method?	5:Moderately
11	Overall	How sufficient is the competition?	8:Very
		How important is 'the competition' in selecting PBL as an acquisition method?	5:Moderately
12	Overall	How important/critical is the system?	8:Very
		How important is 'the system's criticality' in selecting PBL as an acquisition method?	8:Very
13	Overall	How well is the up-front, early planning done?	SELECT
		How important is 'up-front, early planning' in selecting PBL as an acquisition method?	SELECT

INSTRUCTIONS

RESET

GO TO RESULTS

## GO TO EVALUATION

According to author's weighted tool score PBL fits for this acquisition by 59.4 %.				General Scores:	
PBL might be considered as an acquisition strategy. But detailed Business Case Analysis is required.					
To have a more successful PBL pay more attention to improve the factors below:				Occurrences' weighted Tool Score	5.8678
Presence, Determination of metrics, performance outcomes; Improvement in performance;				Author's weighted Tool Score	5.9352
Partnership, strategic alliance; Length of contract; Flexibility; Successful implementation of PBL, PBL experience and training; Innovation; Data availability; Properties of system; .				User's weighted Tool Score	6.2763
				Occurrences' weighted User's Score	5.8323
				Author's weighted User's Score	6.2250
				User's weighted User's Score	6.4405

FACTOR #1: Reduction in total cost of ownership, life cycle cost						
1	Tool Evaluation	10.0000	Occurrences' weight	0.129	Occurrences' weighted Tool Score	1.2903
	User's Score	7.0000	Author's weight	0.060	Author's weighted Tool Score	0.6000
			User's weight	0.083	User's weighted Tool Score	0.8333
					Occurrences' weighted User's Score	0.9032
					Author's weighted User's Score	0.4200
					User's weighted User's Score	0.5833



FACTOR #2: Presence, Determination of metrics, performance outcomes						
2	Tool Evaluation	7.6364	Occurrences' weight	0.120	Occurrences' weighted Tool Score	0.9196
	User's Score	7.0000	Author's weight	0.130	Author's weighted Tool Score	0.9927
			User's weight	0.119	User's weighted Tool Score	0.9091
					Occurrences' weighted User's Score	0.8430
					Author's weighted User's Score	0.9100
					User's weighted User's Score	0.8333



FACTOR #3: Improvement in performance						
3	Tool Evaluation	2.5000	Occurrences' weight	0.112	Occurrences' weighted Tool Score	0.2796
	User's Score	4.0000	Author's weight	0.130	Author's weighted Tool Score	0.3250
			User's weight	0.048	User's weighted Tool Score	0.1190
					Occurrences' weighted User's Score	0.4473
					Author's weighted User's Score	0.5200
					User's weighted User's Score	0.1905



FACTOR #4: Partnership, strategic alliance						
4	Tool Evaluation	8.0000	Occurrences' weight	0.037	Occurrences' weighted Tool Score	0.2925
	User's Score	8.0000	Author's weight	0.110	Author's weighted Tool Score	0.8800
			User's weight	0.095	User's weighted Tool Score	0.7619
					Occurrences' weighted User's Score	0.2925
					Author's weighted User's Score	0.8800
					User's weighted User's Score	0.7619



FACTOR #5: Length of contract						
5	Tool Evaluation	5.0000	Occurrences' weight	0.088	Occurrences' weighted Tool Score	0.4409
	User's Score	7.0000	Author's weight	0.090	Author's weighted Tool Score	0.4500
			User's weight	0.083	User's weighted Tool Score	0.4167
					Occurrences' weighted User's Score	0.6172
					Author's weighted User's Score	0.6300
					User's weighted User's Score	0.5833



FACTOR #6: Flexibility						
6	Tool Evaluation	5.4000	Occurrences' weight	0.084	Occurrences' weighted Tool Score	0.4529
	User's Score	6.0000	Author's weight	0.100	Author's weighted Tool Score	0.5400
			User's weight	0.095	User's weighted Tool Score	0.5143
					Occurrences' weighted User's Score	0.5032
					Author's weighted User's Score	0.6000
					User's weighted User's Score	0.5714



FACTOR #7: Better Service, Best Value Created, Best Practices						
7	Tool Evaluation	8.5000	Occurrences' weight	0.082	Occurrences' weighted Tool Score	0.6946
	User's Score	9.0000	Author's weight	0.080	Author's weighted Tool Score	0.6800
			User's weight	0.060	User's weighted Tool Score	0.5060
					Occurrences' weighted User's Score	0.7355
					Author's weighted User's Score	0.7200
					User's weighted User's Score	0.5357



<b>8</b>	FACTOR #8: Successful implementation of PBL, PBL experience and training						<b>TOP</b>
	Tool Evaluation	1.5000	Occurrences' weight	0.073	Occurrences' weighted Tool Score	0.1097	
	User's Score	1.0000	Author's weight	0.090	Author's weighted Tool Score	0.1350	
			User's weight	0.095	User's weighted Tool Score	0.1429	
					Occurrences' weighted User's Score	0.0731	
					Author's weighted User's Score	0.0900	
					User's weighted User's Score	0.0952	
<b>9</b>	FACTOR #9: Innovation						<b>TOP</b>
	Tool Evaluation	5.8750	Occurrences' weight	0.060	Occurrences' weighted Tool Score	0.3538	
	User's Score	7.0000	Author's weight	0.060	Author's weighted Tool Score	0.3525	
			User's weight	0.107	User's weighted Tool Score	0.6295	
					Occurrences' weighted User's Score	0.4215	
					Author's weighted User's Score	0.4200	
					User's weighted User's Score	0.7500	
<b>10</b>	FACTOR #10: Data availability						<b>TOP</b>
	Tool Evaluation	5.4545	Occurrences' weight	0.058	Occurrences' weighted Tool Score	0.3167	
	User's Score	5.0000	Author's weight	0.055	Author's weighted Tool Score	0.3000	
			User's weight	0.060	User's weighted Tool Score	0.3247	
					Occurrences' weighted User's Score	0.2903	
					Author's weighted User's Score	0.2750	
					User's weighted User's Score	0.2976	
<b>11</b>	FACTOR #11: Candidates and competition						<b>TOP</b>
	Tool Evaluation	10.0000	Occurrences' weight	0.052	Occurrences' weighted Tool Score	0.5161	
	User's Score	8.0000	Author's weight	0.035	Author's weighted Tool Score	0.3500	
			User's weight	0.060	User's weighted Tool Score	0.5952	
					Occurrences' weighted User's Score	0.4129	
					Author's weighted User's Score	0.2800	
					User's weighted User's Score	0.4762	
<b>12</b>	FACTOR #12: Properties of system						<b>TOP</b>
	Tool Evaluation	5.5000	Occurrences' weight	0.037	Occurrences' weighted Tool Score	0.2011	
	User's Score	8.0000	Author's weight	0.060	Author's weighted Tool Score	0.3300	
			User's weight	0.095	User's weighted Tool Score	0.5238	
					Occurrences' weighted User's Score	0.2925	
					Author's weighted User's Score	0.4800	
					User's weighted User's Score	0.7619	
<b>13</b>	FACTOR #13: Up front early planning						<b>TOP</b>
	Tool Evaluation	0.0000	Occurrences' weight	0.000	Occurrences' weighted Tool Score	0.0000	
	User's Score	SELECT	Author's weight	0.000	Author's weighted Tool Score	0.0000	
			User's weight	0.000	User's weighted Tool Score	0.0000	
					Occurrences' weighted User's Score	0.0000	
					Author's weighted User's Score	0.0000	
					User's weighted User's Score	0.0000	



## 5. F-35 Joint Strike Fighter (JSF) Support Program

INSTRUCTIONS			GO TO RESULTS			
<b>FACTOR #1: Reduction in total cost of ownership, life cycle cost</b>						
1	What is the % of reduction expectation in total cost?	20%	1	Overall	How much total cost reduction is expected?	6:Quite a bit
	What is the % of reduction expectation in contract cost?	SELECT		How important is 'total cost reduction' in selecting PBL as an acquisition method?	8:Very	
	What is the % of reduction expectation in human resources requirement?	SELECT				
	What is the % of reduction expectation in inventory cost?	SELECT				
<b>FACTOR #2: Presence, Determination of metrics, performance outcomes</b>						
2	How accurately are the requirements of goods/service defined?	8:Very	2	Overall	How well are the metrics determined regarding requirements?	8:Very
	How well are the metrics aligned to organization's goals?	8:Very			How important is 'well determination of metrics' in selecting PBL as an acquisition method?	10:Extremely
	How clear, understandable, solid, specific are the metrics?	9:More than very				
	How realistic, sound are the metrics?	8:Very				
	How traceable are the metrics?	9:More than very				
	How measurable are the metrics?	8:Very				
	Are the metrics negotiated with candidates?	NO				
	How fair are the metrics for all partners?	8:Very				
	Are metrics expressed in any of those, below?	YES				
	*Operational availability_Readiness					
	*Operational reliability					
	*Cost per unit usage_Affordability					
	*Logistics footprint					
	*Logistics response time_Cycle time					
Is a target value set for each metrics?	YES					
How many metrics are planned to use in contract?	6					
<b>FACTOR #3: Improvement in performance</b>						
3	What is the improvement expectation in % for the 1st metrics?	15%	3	Overall	How much performance improvement is expected?	6:Quite a bit
	What is the improvement expectation in % for the 2nd metrics?	10%			How important is 'performance improvement' in selecting PBL as an acquisition method?	10:Extremely
	What is the improvement expectation in % for the 3rd metrics?	5%				
	What is the improvement expectation in % for the 4th metrics?	10%				
	What is the improvement expectation in % for the 5th metrics?	5%				
	What is the average improvement expectation in % for other metrics?	5%				
<b>FACTOR #4: Partnership, strategic alliance</b>						
4	What type of relationship is expected to be built with provider?	Partnership: 8	4	Overall	How well relationships is expected to be built, managed?	7:More than quite a bit
	How much integration is expected to be built with provider?	SELECT			How important is 'relationship between partners' in selecting PBL as an acquisition method?	8:Very
	How trustful are the partners to each other?	SELECT				
	How much information is planned to be shared with partners?	SELECT				
	How much of physical network is planned to be shared among partners?	SELECT				
	How much risk will be shared among partners?	SELECT				
	How much of benefits will be shared among partners?	SELECT				
	How well the relationships are managed?	SELECT				
	How supportive is the management to culture change?	SELECT				
	How acceptable is this culture change among employees?	SELECT				
<b>FACTOR #5: Length of contract</b>						
5	What is the contract's planned length in years?	N/A	5	Overall	How sufficient is the contract's length?	7:More than quite a bit
	How sufficient is the contract's length for return on investment allowance?	9:More than very			How important is 'the contract's length' in selecting PBL as an acquisition method?	9:More than very
	How sufficient is the contract's length for providing cash flow continuity to provider?	10:Extremely				
	How sufficient is the contract's length to accomplish a certain performance level of the desired outcomes?	8:Very				
<b>FACTOR #6: Flexibility</b>						
6	How flexible are the acquisition plan and the terms for provider's actions?	N/A	6	Overall	How flexible is the acquisition plan for provider's actions?	7:More than quite a bit
	How much freedom is provided for contractor's actions?	9:More than very			How important is 'Flexibility' in selecting PBL as an acquisition method?	6:Quite a bit
	How much decentralized is the authority?	7:More than quite a bit				
	How much decentralized are the responsibilities?	8:Very				
	How constraining are the acquisition plan and the terms with specifications, 'what' and 'how to do's?	1:More than none				
	How constraining are financial, political, statutory barriers?	3:More than a little				
<b>FACTOR #7: Better Service, Best Value Created, Best Practices</b>						
7	How well will the expected service quality be provided by organic structure in this partnership?	5:Moderately	7	Overall	How well is the expected service quality provided by this partnership?	7:More than quite a bit
	How well will the expected service quality be provided by commercial structure in this partnership?	9:More than very			How important is 'the expected service quality' in selecting PBL as an acquisition method?	7:More than quite a bit
	How capable is the organic structure to manage life cycle of system?	SELECT				
	How qualified is the organic structure for directing supply chain?	SELECT				
	How knowledgeable is the organic structure about system?	SELECT				
	How experienced is the organic structure about system?	SELECT				
	How skilled is the organic manpower regarding job to be done?	SELECT				
	How skilled is the acquisition personnel regarding job to be done?	SELECT				
	How capable is the commercial structure to manage life cycle of system?	SELECT				
	How qualified is the commercial structure for directing supply chain?	SELECT				
	How knowledgeable is the commercial structure about system?	SELECT				
	How experienced is the commercial structure about system?	SELECT				
	How skilled is the commercial manpower regarding job to be done?	SELECT				
	How well is the work allocation done between partners according to best practices?	SELECT				

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FACTOR #8: Successful implementation of PBL, PBL experience and training			
8	How experienced is the 1st partner (organic) in PBL?	2:A little	
	How experienced is the 2nd (commercial) partner in PBL?	9:More than very	
	How experienced is the 3rd (commercial) partner in PBL?	N/A	
	How experienced are the other commercial partners in PBL as an average?	N/A	
	How much importance is given to educational programs/training for PBL in partnership?	7:More than quite a bit	
	How trained/knowledgeable is the acquisition personnel about PBL?	5:Moderately	
How committed are the managements for the culture change?		9:More than very	
FACTOR #9: Innovation			
9	How constraining are the terms blocking innovational approaches?	3:More than a little	
	How incentivizing are the terms encouraging innovational approaches?	6:Quite a bit	
	How much freedom is present to encourage innovational approaches?	7:More than quite a bit	
	People: How capable are the employees regarding well-known record of generating innovative ideas in this partnership?		8:Very
	People: How important is screening innovation skills in hiring process in this partnership?		N/A
	People: How important will innovation be as a factor at employees' performance evaluations in this partnership?		N/A
	Process: How frequently will brainstorming and generating new ideas take place in this partnership?		N/A
	Process: How important will 'challenging the status quo/conventional ways' be in this partnership?		7:More than quite a bit
	Process: How interactive will this partnership be for seeking opportunities with customers, competitors, suppliers, etc.?		N/A
	Process: How spreaded will 'the networking through outside of this partnership' be for new ideas?		N/A
	Process: How supportive will this partnership be for adopting pilot programs or experiments?		8:Very
	Philosophies: How encouraging will this partnership be to employees to offer creative ideas?		N/A
	Philosophies: How supportive will this partnership be to risk taking for new ideas?		N/A
	FACTOR #10: Data availability		
10	How adequate is historical data?	6:Quite a bit	
	How accurate is historical data?	5:Moderately	
	How adequate is cost data?	2:A little	
	How accurate is cost data?	7:More than quite a bit	
	How adequate will the expected recent data be for metrics' evaluation?	2:A little	
	How accurate will the expected recent data be for metrics' evaluation?	7:More than quite a bit	
	How many years of performance data is in hand?	Less than 2.5 Months	
	How attainable will the expected recent data/values of metrics be?	8:Very	
	How timely is the data management as a level of real time?	9:More than very	
	How adequate are the data collection tools?	8:Very	
How sufficient is the market for cost estimation?	1:More than none		
FACTOR #11: Candidates and competition			
11	How constraining are the terms blocking competition?	3:More than a little	
	Are alternative systems considered to meet requirements?	YES	
	Are qualified international sources permitted to enter?	YES	
	How sufficient is 'the number of candidates' willing to enter PBL partnership?	8:Very	
	In case of sole candidate; is the candidate OEM/Prime Vendor or other?	N/A	
	How many partners are present in PBL including buyer?	2	
FACTOR #12: Properties of system			
12	Is contract's subject a new goods/service?	YES	
	How critical is the goods/service regarding strategic importance?	10:Extremely	
	How technologically advanced are the requirements regarding the goods/service?	10:Extremely	
	How complex is the goods/service?	9:More than very	
	What is the percentage of expected life left on goods/service?	100%	
	How reliable is the goods/service?	5:Moderately	
	How much investment is required for insourcing?	8:Very	
FACTOR #13: Up-front, early planning			
13	Is 'PBL decision' given early in acquisition of system?	YES	
	Is 'sustainment of the system as it is being designed' well-planned up-front?	YES	
	Is 'service of the system serviced in the field' well-planned up-front?	YES	
	Is 'partnering of industry and service branch support personnel in sustaining that asset' well-planned up-front?	NO	
	Is 'determination of the multiple responsibilities' well-planned up-front?	YES	

8	Overall	How experienced is this partnership in PBL?	5:Moderately
		How important is 'experience in PBL' in selecting PBL as an acquisition method?	10:Extremely
9	Overall	How innovative is this partnership?	6:Quite a bit
		How important is 'innovation' in selecting PBL as an acquisition method?	8:Very
10	Overall	How sufficient are the available data and data collection?	6:Quite a bit
		How important is 'the data availability' in selecting PBL as an acquisition method?	9:More than very
11	Overall	How sufficient is the competition?	6:Quite a bit
		How important is 'the competition' in selecting PBL as an acquisition method?	6:Quite a bit
12	Overall	How important/critical is the system?	9:More than very
		How important is 'the system's criticality' in selecting PBL as an acquisition method?	7:More than quite a bit
13	Overall	How well is the up-front, early planning done?	5:Moderately
		How important is 'up-front, early planning' in selecting PBL as an acquisition method?	5:Moderately

INSTRUCTIONS

RESET

GO TO RESULTS

## GO TO EVALUATION

According to author's weighted tool score PBL fits for this acquisition by 70.5 %.

PBL is advised as an acquisition strategy. Business case analysis is required.

To have a more successful PBL pay more attention to improve the factors below:

Reduction in total cost of ownership, life cycle cost; Presence, Determination of metrics, performance outcomes; Improvement in performance; Partnership, strategic alliance; Flexibility; Better Service, Best Value Created, Best Practices ; Successful implementation of PBL, PBL experience and training; Innovation; Data availability; Up-front, early planning.

General Scores:

Occurrences' weighted Tool Score	6.9132
Author's weighted Tool Score	7.0497
User's weighted Tool Score	7.0347
Occurrences' weighted User's Score	6.5821
Author's weighted User's Score	6.6800
User's weighted User's Score	6.5437

FACTOR #1: Reduction in total cost of ownership, life cycle cost

<b>1</b>	Tool Evaluation	5.0000	Occurrences' weight	0.125	Occurrences' weighted Tool Score	0.6237
	User's Score	6.0000	Author's weight	0.050	Author's weighted Tool Score	0.2500
			User's weight	0.078	User's weighted Tool Score	0.3883
					Occurrences' weighted User's Score	0.7484
					Author's weighted User's Score	0.3000
					User's weighted User's Score	0.4660

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FACTOR #2: Presence, Determination of metrics, performance outcomes

<b>2</b>	Tool Evaluation	7.0909	Occurrences' weight	0.116	Occurrences' weighted Tool Score	0.8256
	User's Score	8.0000	Author's weight	0.125	Author's weighted Tool Score	0.8864
			User's weight	0.097	User's weighted Tool Score	0.6884
					Occurrences' weighted User's Score	0.9314
					Author's weighted User's Score	1.0000
					User's weighted User's Score	0.7767

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FACTOR #3: Improvement in performance

<b>3</b>	Tool Evaluation	4.1667	Occurrences' weight	0.108	Occurrences' weighted Tool Score	0.4505
	User's Score	6.0000	Author's weight	0.125	Author's weighted Tool Score	0.5208
			User's weight	0.097	User's weighted Tool Score	0.4045
					Occurrences' weighted User's Score	0.6486
					Author's weighted User's Score	0.7500
					User's weighted User's Score	0.5825

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FACTOR #4: Partnership, strategic alliance

<b>4</b>	Tool Evaluation	8.0000	Occurrences' weight	0.102	Occurrences' weighted Tool Score	0.8150
	User's Score	7.0000	Author's weight	0.100	Author's weighted Tool Score	0.8000
			User's weight	0.078	User's weighted Tool Score	0.6214
					Occurrences' weighted User's Score	0.7131
					Author's weighted User's Score	0.7000
					User's weighted User's Score	0.5437

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FACTOR #5: Length of contract

<b>5</b>	Tool Evaluation	9.0000	Occurrences' weight	0.085	Occurrences' weighted Tool Score	0.7672
	User's Score	7.0000	Author's weight	0.090	Author's weighted Tool Score	0.8100
			User's weight	0.087	User's weighted Tool Score	0.7864
					Occurrences' weighted User's Score	0.5967
					Author's weighted User's Score	0.6300
					User's weighted User's Score	0.6117

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FACTOR #6: Flexibility

<b>6</b>	Tool Evaluation	8.0000	Occurrences' weight	0.081	Occurrences' weighted Tool Score	0.6486
	User's Score	7.0000	Author's weight	0.100	Author's weighted Tool Score	0.8000
			User's weight	0.058	User's weighted Tool Score	0.4660
					Occurrences' weighted User's Score	0.5676
					Author's weighted User's Score	0.7000
					User's weighted User's Score	0.4078

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FACTOR #7: Better Service, Best Value Created, Best Practices

<b>7</b>	Tool Evaluation	7.0000	Occurrences' weight	0.079	Occurrences' weighted Tool Score	0.5530
	User's Score	7.0000	Author's weight	0.080	Author's weighted Tool Score	0.5600
			User's weight	0.068	User's weighted Tool Score	0.4757
					Occurrences' weighted User's Score	0.5530
					Author's weighted User's Score	0.5600
					User's weighted User's Score	0.4757

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<b>FACTOR #8: Successful implementation of PBL, PBL experience and training</b>							<b>T O P</b>
<b>8</b>	Tool Evaluation	6.2500	Occurrences' weight	0.071	Occurrences' weighted Tool Score	0.4418	
	User's Score	5.0000	Author's weight	0.090	Author's weighted Tool Score	0.5625	
			User's weight	0.097	User's weighted Tool Score	0.6068	
					Occurrences' weighted User's Score	0.3534	
					Author's weighted User's Score	0.4500	
					User's weighted User's Score	0.4854	
<b>FACTOR #9: Innovation</b>							<b>T O P</b>
<b>9</b>	Tool Evaluation	7.1667	Occurrences' weight	0.058	Occurrences' weighted Tool Score	0.4172	
	User's Score	6.0000	Author's weight	0.060	Author's weighted Tool Score	0.4300	
			User's weight	0.078	User's weighted Tool Score	0.5566	
					Occurrences' weighted User's Score	0.3493	
					Author's weighted User's Score	0.3600	
					User's weighted User's Score	0.4660	
<b>FACTOR #10: Data availability</b>							<b>T O P</b>
<b>10</b>	Tool Evaluation	5.0000	Occurrences' weight	0.056	Occurrences' weighted Tool Score	0.2807	
	User's Score	6.0000	Author's weight	0.055	Author's weighted Tool Score	0.2750	
			User's weight	0.087	User's weighted Tool Score	0.4369	
					Occurrences' weighted User's Score	0.3368	
					Author's weighted User's Score	0.3300	
					User's weighted User's Score	0.5243	
<b>FACTOR #11: Candidates and competition</b>							<b>T O P</b>
<b>11</b>	Tool Evaluation	10.0000	Occurrences' weight	0.050	Occurrences' weighted Tool Score	0.4990	
	User's Score	6.0000	Author's weight	0.035	Author's weighted Tool Score	0.3500	
			User's weight	0.058	User's weighted Tool Score	0.5825	
					Occurrences' weighted User's Score	0.2994	
					Author's weighted User's Score	0.2100	
					User's weighted User's Score	0.3495	
<b>FACTOR #12: Properties of system</b>							<b>T O P</b>
<b>12</b>	Tool Evaluation	9.6667	Occurrences' weight	0.035	Occurrences' weighted Tool Score	0.3416	
	User's Score	9.0000	Author's weight	0.060	Author's weighted Tool Score	0.5800	
			User's weight	0.068	User's weighted Tool Score	0.6570	
					Occurrences' weighted User's Score	0.3181	
					Author's weighted User's Score	0.5400	
					User's weighted User's Score	0.6117	
<b>FACTOR #13: Up-front, early planning</b>							<b>T O P</b>
<b>13</b>	Tool Evaluation	7.5000	Occurrences' weight	0.033	Occurrences' weighted Tool Score	0.2495	
	User's Score	5.0000	Author's weight	0.030	Author's weighted Tool Score	0.2250	
			User's weight	0.049	User's weighted Tool Score	0.3641	
					Occurrences' weighted User's Score	0.1663	
					Author's weighted User's Score	0.1500	
					User's weighted User's Score	0.2427	



## Appendix D: Study Board

# An Assessment Tool of Performance Based Logistics Appropriateness

**OBJECTIVE:**

Finding the factors that affect selection of PBL as an acquisition method and building a spreadsheet tool according to these factors.

**RESEARCH QUESTION:**

What factors determine the appropriateness of the selection of PBL as a strategy for a specific acquisition?

**INTRODUCTION:**

PBL is determined product support strategy. Using PBL is mandated by DoD, regulated by FAR, suggested by Defense Acquisition University.

Basic policy is applying PBL whenever wherever possible. But not all acquisitions for services can be conducted in a performance-based manner. There are exceptions.

In contrast with DoD's policy there is not much about these exceptions in the PBL literature.

**CONTRIBUTION:**

Determining these exceptions by building the assessment tool which includes the factors and their affects.

This tool will help in decision making processes, Business Case Analysis.

That will save decision makers' time.

That will give more objective results.

**OVERVIEW:**

81 documents are taken as sample literature.

Questions are prepared according to this literature.

Tool applied to 5 different acquisitions in Turkey.

**1<sup>st</sup> Lt. Korhan Yukselen, TurAF**  
**Advisor: Dr. Jeffrey Ogden**  
**Reader: Dr. William Cunningham**  
 Department of Operational Sciences (ENS)  
 Air Force Institute of Technology

**CONCLUSION:**

PBL is not applicable to every acquisition. But it is possible to determine the success of PBL by looking at the factors of selecting PBL as an acquisition method. This research lists these factors and explains how they affect the success. The tool, built according to this information, is a handy tool which will help detailed, time consuming business case analysis. In decision making process and save time which is precious for decision makers. Not only this research but also the tool, itself is a contribution.

**FACTORS EFFECTING SUCCESS OF PBL**

1. Reduction in total cost of ownership, life cycle cost
2. determination of metrics, performance outcomes
3. Improvement in performance
4. Partnership, strategic alliance
5. Length of contract
6. Flexibility
7. Better service, best value creation, best practices
8. Successful implementation of PBL, PBL experience
9. Innovation
10. Data availability
11. Candidates and competition
12. Properties of system
13. Up-front, early planning

Factor	Weight	Score
1. Reduction in total cost of ownership, life cycle cost	10	10
2. determination of metrics, performance outcomes	10	10
3. Improvement in performance	10	10
4. Partnership, strategic alliance	10	10
5. Length of contract	10	10
6. Flexibility	10	10
7. Better service, best value creation, best practices	10	10
8. Successful implementation of PBL, PBL experience	10	10
9. Innovation	10	10
10. Data availability	10	10
11. Candidates and competition	10	10
12. Properties of system	10	10
13. Up-front, early planning	10	10

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## **Vita**

First Lieutenant Korhan Guvenc Yukselen was born in Ankara, TURKEY. He finished his elementary and secondary school educations in Ankara and attended the Ankara Ataturk Anatolian High School in 1995. He graduated from high school in 1999 and started his education in the Turkish Air Force Academy. He earned the degree of Bachelor of Science in Industrial Engineering after graduating from the Turkish Air Force Academy in 2003 with honors.

His first assignment was at Cigli, Izmir as a student in basic pilot training in 2003. In 2004 he was assigned to Air Technical School for branch education as a Finance Officer. After this education, he was assigned to 1<sup>st</sup> Air Force Command Headquarters Eskisehir in 2005. He entered the Graduation School of Engineering, Air Force Institute of Technology in 2010. Upon graduation, he will be assigned to a logistics/finance post in Turkish Air Force.

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